ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER

ESTABLISHED 1872

Vol. CXLV. No. 3743
19th AUGUST, 1949

Chimney Flue-dust

ELECTROSTATIC PRECIPITATION OR ULTRASONIC AGGLOMERATION ?

THE broad fundamental laws governing the electrostatic precipitation of solid particles and fluid substances suspended in gases have been understood for a long time. The fact that dust is a most sensitive indicator of the presence of an electric charge was noticed in 1819 and the effectiveness of the principle for the precipitation of smoke was demonstrated in 1824.

Since about 1910, when means of applying unidirectional current at up to 50 kV became reliable, electrostatic precipitation has been successfully employed in many different industries for a variety of purposes, and new uses are still being devised.

Limits on Precipitators

Theoretically this method will extract from a carrying gas any particles, no matter how fine, providing that the particles are tangible. The simple process of electrical precipitation is, however, considerably complicated in practice because it is so rarely possible to ensure the constancy of certain factors and the uniformity of others, which are necessary for securing the high efficiency possible when the plant is designed for a particular duty.

Unfortunately prevailing circumstances will not allow many power stations to satisfy all the requirements. Indeed, they may not be able to do so until coal of consistent quality is supplied regularly (incidentally assuming adequacy of the means of its transportation) to generating stations. Moreover, there must be more investigatory work on commercial-scale installations (as distinct from laboratory tests) resulting in the establishment of design constants which, in turn, may reduce the size of commercial plant and hence the capital cost of installations.

Electrostatic precipitators do not contribute anything to the generation of electricity; on the contrary their operation absorbs a quite considerable amount of power. Their function is to extract dust from boiler-flue gases produced by the combustion of a variety of coals, so helping to abate the nuisance which the emission of "dirty" smoke may cause.

In other industries which employ the same principle for cleaning gases to render them more readily saleable and for recoving useful substances from unwanted vapours, there is a direct incentive to improve the process or seek a commercially better method. The annual report of the chief inspector of premises subject to the Alkali, etc., Works Regulation Act, which is referred to on another page, shows that there is a similar urge on the part of manufacturers whose plants emit noxious fumes to the atmosphere.

American Development

Thus a siren-type of ultrasonic sound generator has been developed in America for the recovery of sulphuric fog from the exhaust stacks of acid manufacturing plant. Experiments appear to have been proceeding since 1940 in mining circles.

Particles of a diameter less than 0.01 micron are said to be readily agglomerated in this way. Excitation at frequencies above 18,000 c/s increases the

rate of particle collision and the kinetic effect of particle rotation, with other factors, causes the formation of thin wafers at intervals equal to one-half of the sound wavelength. The wafers settle out of the atmosphere in a few seconds, the time depending upon size and concentration of particles. High-frequency sound has been produced in this way of sufficient intensity to maintain lead shot in suspension in air. Utilization of the effect seems to be practical on an industrial scale. Only experience in service will prove whether, as claimed, the system is more economical than the other methods hitherto employed.

LIGHTING CONFERENCE

A VARIED programme has been arranged by the Association of Public Lighting Engineers for its Llandudno Conference next month. An endeavour seems to have been made to balance gas and electricity both in the papers and in the display of equipment which again forms a feature of the gathering. An interesting guest, who is reading a paper, is Monsieur L. Gaymard, chief lighting engineer of Paris—*la Ville Lumière*.

BELFAST FINANCES

IN the past three years the surplus profits of the Belfast municipal electricity undertaking have averaged £119,000. By its policy of using these sums entirely for the purposes of the undertaking and allocating substantial amounts each year for special debt redemption, the Corporation has built up a sound financial structure and is able to make a number of reductions in charges. It would not be correct, however, to contrast these concessions with increased charges in Great Britain under nationalization. In Belfast, coal price increases, one of the main items in higher costs, are covered by clauses for varying electricity charges under all tariffs, whereas generally in this country these apply only to power rates.

DESIRABLE PUBLICITY

MOST of the Electricity Consultative Councils admit the Press to their meetings. This is as it ought to be; there can be (or should be) nothing secret about the public's views on the new electricity organization or about the Electricity Boards' intentions. It is not understandable, therefore, why the meetings of local committees set up by the Councils should be heard *in camera*. Yet the *Eastern Daily Press* complains that its representative has been refused admission by the Norfolk Local Committee on the ground that the Consultative Council's standing orders are thus being complied with. We cannot believe that this practice is general among the Electricity Consultative Councils, and we trust that wherever it is being followed it will be stopped as soon as possible.

CANADIAN GOODWILL

THE *Winnipeg Free Press* reported recently that, in order to impress the people of Saskatchewan with the importance of purchasing British goods, "wherever competitive in efficiency and price," the week from 26th September to 1st October had been proclaimed "British Trade Week" by Order-in-Council. Civic officials throughout the Province are to be asked to request merchants and traders to feature and further the sale of British goods during the week. Although time is short, it is to be hoped that British manufacturers will be able to assist in making this excellent "gesture" a success. Those who desire to participate will doubtless note the qualification that goods must be "competitive in efficiency and price."

THE PLUG PROBLEM

A CANADIAN visitor recently suggested to us that electrical retailers should always provide flex and plugs with appliances. We had to tell him that half the plugs would be useless as we had not yet fitted the standard outlet to any extent. The matter crops up again in "Peterborough's" notes in the *Daily Telegraph*. Here the plaint of a photographer from Ottawa is expressed. He is said to have returned home with a collection of twelve different plugs which he had had to buy while moving around this country. He rightly says that his job would have been easier if plugs had been standard, as in Canada and the United States. General adoption of the standard would also greatly ease the lot of the British electrical industry.

Limestone Quarrying

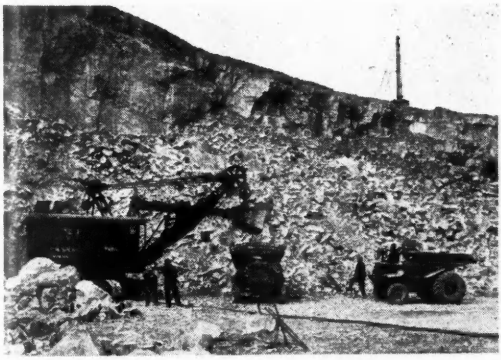
ELECTRICAL PROCESSING EQUIPMENT

WHEN in the Keighley area of Yorkshire a few weeks ago we were able to inspect some recent additions to the limestone processing plant at Swinden Quarry, which is pleasantly situated among the Pennines about five miles to the north-west of Skipton. This quarry, which is operated by P. W. Spencer & Co., Ltd., is one of the largest in the district, and with the new installation it is now almost entirely electrically operated, the amount of manual labour required being cut to the absolute minimum. When it is working at maximum output it is capable of producing about 800 tons of limestone a day, of which 60 per cent is used in the making of steel. The rest is employed for many purposes, including road making and railway track ballast, while some is ground into flour for asphalt or incorporation in chicken grit.

The quarry face is about 80ft high, and in its present semi-circular shape about 250 yards in diameter. Rock is claimed by blasting away from the face, and in preparation for this a series of charge-holes are bored down from the top to quarry floor level. For boring, a 6in diameter diesel-driven well-drill is used, the arrangement being similar to that employed when drilling for oil.

The stone is then gathered up by a Ruston Bucyrus excavator, which is driven by a B.T.H. 75 h.p. three-phase 400V motor, and loaded in dumpers. The power for this excavator is derived through a flexible rubber cable with wire armouring from either of two connection boxes which are situated on the floor of the quarry. One of these, which is quite near to the quarry face, is set flush with the ground, so that when blasting is in progress the excavator can be moved out of the way, its cable being placed in the connection box and the whole covered over with heavy timbers.

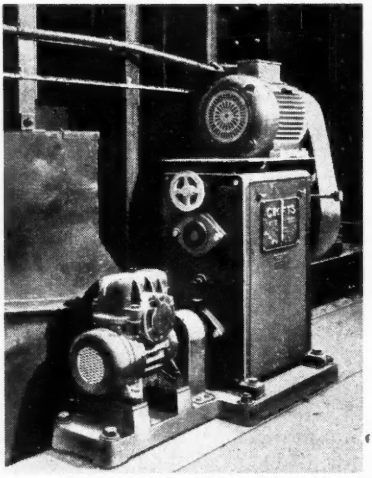
Some of the stone comes down from the face in lumps which are too large to be handled by the excavator, so they are subjected to what is known as secondary blasting. In readiness for this they are drilled by means of 1.25in compressed-air operated rock drills. The



Rock is collected from the quarry face and loaded into dumpers by an electrically operated excavator

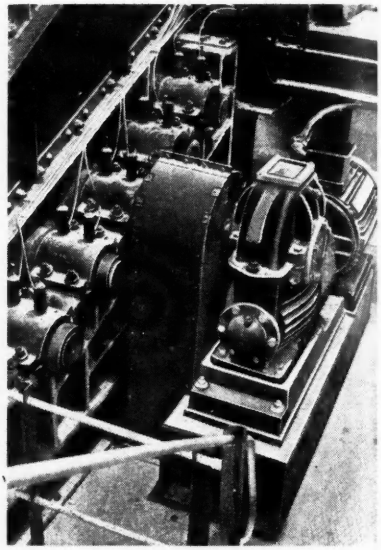
source of supply for these is a Broom & Wade electrically driven compressor rated at 400 cu ft/min, which is automatically operated to maintain a pressure of 85 lb/sq in within an outdoor tank.

The dumpers take the stone across the quarry to the processing plant where it is tipped into a hopper, the top of which is at ground level. At the bottom of this hopper is an apron feeder driven by a 7.5 h.p. three-phase motor via a multiple vee belt drive and suitable reduction gearing which incorporates a 4:1 variable speed control. This conveys the stone forward on to what is known as a "live-roll-grizzly." It comprises a series of serrated rollers, each one rotating slightly faster than the previous one, the whole being driven by a 30 h.p. squirrel cage motor through a system of gears. These rollers carry the larger pieces of stone downwards at an angle of 45 deg. to the jaws of the Hadfield crusher, the smaller pieces, together with any refuse which may be present dropping between the rolls on to a 24in con-



veyor belt which transports it to the washing plant.

The crusher, which may be likened to a gigantic pair of nutcrackers, is driven by a 150 h.p. slip ring machine through a multiple vee belt drive. It is equipped with liquid resistance starting arrangements on the gallery above, but it may be stopped by means of push-buttons which are placed at convenient positions on the machine itself. Crushed stone drops from the jaws on to a 36in conveyor belt immediately below. This takes it up to the screen house, which is situated on the top of a tower about 75 yards away. Half-way along the conveyor housing, between the crusher and screen houses, is the 30 h.p. driving motor. It is arranged for direct-on starting, and



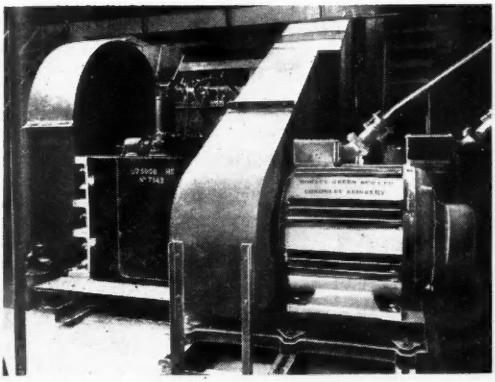
This 30 h.p. motor and system of gearing drives is known as the "live-roll-grizzly"

The drive for the apron feeder under the main hopper in the crusher house is seen on the left

will start easily on full load, the drive being spring loaded with a worm reduction gear on to the final drive. Emergency stop buttons are conveniently placed at intervals along the conveyor housing, so that if, in passing, an operator notices a blockage on the belt he can stop the plant at once.

At this point it may be mentioned that emergency stop buttons are placed all over the plant. These are arranged in conjunction with one another, so that

when one is pressed, the machine with which it is associated stops, together with all other machines behind it in the production line. In order to save time in such a case of emergency, all the machines in front of the fault keep running. Throughout the plant each motor starter is electrically connected with a sequence switch of its own, so that for maintenance purposes it can be isolated from the interlocking arrangements. Thus, any machine can be run on test when the rest of the plant is out of action.

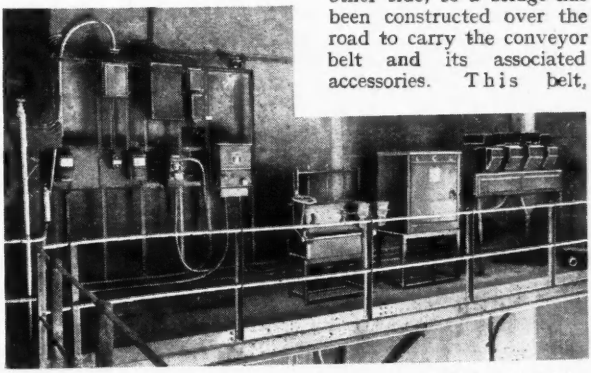


The Hadfield crusher is powered by a 150 h.p. slip-ring machine arranged for liquid resistance starting

When the rock reaches the screen house it falls off the end of the belt into a chute which guides it into a rotary screen. This is a drum 5ft in diameter and 15ft long, which is mounted at an angle of about 15 deg downwards from the incoming end. The three sections of this drum are perforated to pass rocks of 3in and 6in nominal diameter respectively into either of two hoppers below, larger ones passing straight through and being discharged into a third hopper. Motive power to rotate this screening drum is derived through a belt drive and reduction gearing from a 12.5 h.p. motor arranged for direct-on starting.

The 3in rocks are gravity fed from the hopper into bunkers and from there they are conveyed to the tar macadam plant which is part of the original installation. At the bases of the other two hoppers are apron feeders, similar to the one in the crusher house, which transfer the stone on to a further conveyor belt for delivery to the liming kilns. Each of them is driven by a 3 h.p. motor, and the starting gear is arranged so that only one of them can be operated at a time, thus enabling the size of stone for the kilns to be selected at will. The controls also incorporate a Venner time switch to stop the belt to the kilns and whichever apron feeder may be in service, after a predetermined period. This not only prevents stone piling up at the kiln, but allows the quantity of stone for liming to be regulated fairly accurately.

The plant which has been described so far is situated on the quarry side of the roadway. The liming kilns are on the other side, so a bridge has been constructed over the road to carry the conveyor belt and its associated accessories. This belt,

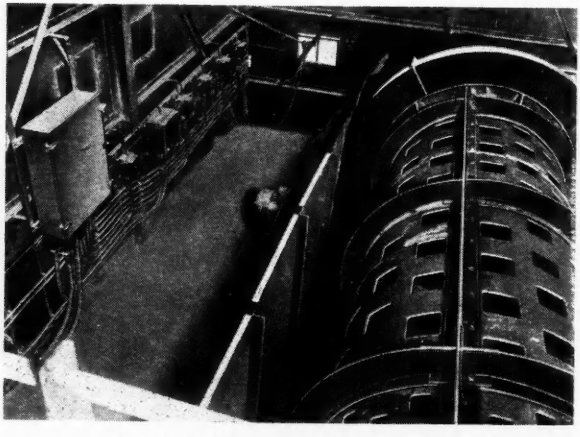


Incoming mains, switchgear and protective arrangements in the gallery of the crusher house

which runs from the screen house to just beyond the farthest kilns, is operated by means of a 7 h.p. d.c. motor.

There are six kilns in all, arranged two on one side of the conveyor belt and four on the other, and stone can be diverted into any one of them at will by a "tripper." This vehicle, which can be traversed in either direction along rails just above the belt, is driven by a 3 h.p. machine, and is equipped with an electromagnetic braking system. Limit switches fitted to the rails prevent it overrunning should the operator inadvertently forget to stop it running.

The power pick-up for the tripper is obtained through a flexible cable which is fed out from a spring-loaded cable drum on the conveyor housing, thus avoiding the use of live rails and the risk of electric shock to the operators. An added advantage of this arrangement is the avoidance of exposed rubbing contacts which might give rise to trouble owing to adverse weather conditions or the corrosive fumes which are always rising from the kilns immediately below. Inside the tripper is a system of lever-operated deflector plates which, when they are lowered on to the belt, are arranged to cause stone to be pushed into any particular kiln.



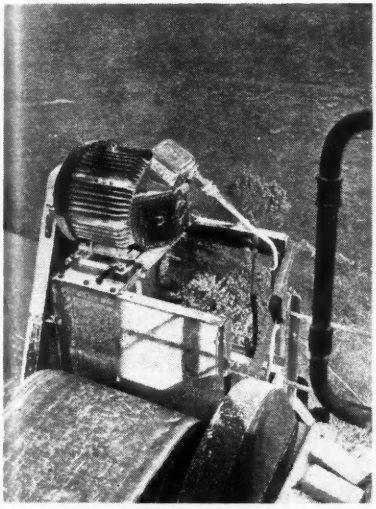
Stone is sorted into three different sizes by this perforated drum which is rotated by a 12·5 h.p. motor arranged for direct-on starting

Referring back to the crusher house, it was mentioned that any material which dropped between the rolls of the "live-roll-grizzly" was dropped on to a 24in conveyor belt and taken to the washing plant. This is situated just below and at the crusher house side of the screening plant. Here the stone and any refuse that may be present is passed into a drum 18ft long and 5ft in diameter, which is rotated by a 15 h.p. squirrel-cage motor. Water is passed through the drum in the opposite direction to the stone, the refuse being separated from usable material. The clear limestone which is thus claimed is removed and processed in part of the old plant for use in roadmaking, building and other purposes.

The electricity supply to the quarry comes from Gargrave, about six miles away, by overhead line at 33 kV, and in the main substation just behind the liming kilns it is stepped down to 11 kV. An underground cable into an adjacent cubicle feeds a pair of English Electric pumpless steel-tank mercury arc rectifiers which are used to supply various d.c. motors in part of the old plant. These will eventually be done away with when the few remaining d.c. machines have been replaced by a.c. ones. From a circuit-breaker on the 11 kV side of the B.E.A. transformer a 0.6 sq in four-core cable is run over the conveyor belt bridge between the kilns and the screen house to another substation near the crusher house 150 yards away. Here there is an 11,000/400 V three-phase transformer and associated switchgear arranged to feed and control all sections of the new plant. All of the cables used in the quarry have been specially served for use in limestone-laden atmospheres, "Pyrotenax" mineral insulated metal-clad cables having been used for all protective circuits and interlocking arrangements. In places, such

as on the conveyor belt runs, where the installation of normal lead-sheathed and armoured cable would have presented no little difficulty, aluminium-sheathed cables of Johnson & Phillips manufacture have been employed.

The remainder of the plant, which is fully mechanized, has been in existence



This 7 h.p. d.c. motor is in an unusual position. It drives the conveyor belt delivering stone to the kilns.

for a number of years, but some idea of the increased efficiency of the plant as a whole may be gained from the knowledge that, before the recent additions, stone was removed from the quarry, crushed, sorted and conveyed to the kilns by hand. Apart from reducing the number of workers, the new arrangements have increased the output of the quarry many times over.

All the motors throughout the installation were supplied by Horace Green, Ltd., and, in view of the dusty conditions under which they have to work, they are all of the totally enclosed surface-cooled type. The electrical equipment was installed by Messrs. S. Richards, Temple Street, Keighley, Yorks. Acknowledgment is also due to P. W. Spencer & Co., Ltd., for permission to visit the quarry.

Fish Preservation

A Hydro-Electric Problem

METHODS by which salmon, trout and other fish can be preserved from possible destruction in the hydro-electric schemes now being developed in Perthshire and the North Highlands are being studied in the laboratory at the former Dudhope electricity station, Dundee, under the direction of Mr. N. G. Lethlean.

By means of the photo-electric cell apparatus it is hoped to count the fish going up the fish ladders being created to facilitate the passage of salmon from the rivers over the dams and so to the upper reaches to spawn. A counting device for this purpose has been designed and developed by the staff at Dundee. Other problems are how to prevent salmon and their smaller kind from entering the tunnels and getting into the generating machinery and how to induce them to use the fish passes. It is also necessary to ascertain how the fish are affected by water pressure in the tunnels.

In an article published in the magazine of the Royal Zoological Society of Scotland, Dr. John Berry, Tayfield, Newport, who is the North of Scotland Hydro-Electric Board's biologist, discusses various aspects of the subject. He mentions that in at least one of the Hydro Board's fish passes it is planned to have an observation chamber with glass windows from which the movement of fish can be studied. With regard to the installation of automatic counting devices in order to obtain data as to the numbers of fish which use the passes and the manner in which they do so, many technical difficulties have yet to be solved. For the 23ft diam. Clunie tunnel a mechanical screen to prevent the loss of salmon smolts would have to be over 4,000 sq ft in area.

As an alternative to these very large and costly mechanical screens the Hydro Board is investigating the use of deterrent "screens." The effects are being tried of electric pulses in water, of sonic and supersonic barriers of underwater "noise" and other ways of frightening fish from tunnel entrances.

Dr. Berry says that some years ago he made a series of tests with coloured lights to see whether different species of fish could be separated by their individual dislikes of certain colours. A blue-green light seemed to be shunned by eels, although apparently not heeded by trout or salmon.

Other phases of the fishing problems are being investigated in laboratories established by the Government and hydro-electric authorities at Faskally.

Views on the News

By REFLECTOR

THIS year's meeting of the British Association is at Newcastle-upon-Tyne, a city with which Sir Joseph Swan had strong connections. It is appropriate, therefore, that examples of the work of this great pioneer of electric light should be seen by the delegates. At the Industrial Museum, Mr. S. Kay is arranging for a collection of Swan's lamps together with samples of the artificial silk which Sir Joseph produced in the course of his lighting experiments.

★ ★ ★

Sir Joseph Swan's name also crops up in another connection. Mr. Kenneth Brown writes to the *Railway Gazette* to claim for Sir Joseph the responsibility for the first electric lighting in a railway carriage. This car made its first run on the London, Brighton and South Coast Railway in 1881; it was equipped with Swan lamps and Fauré storage batteries which were charged at Victoria each night. Incidentally, the L.B. & S.C.R. was a pioneer of the overhead current collecting system in this country (under the late Sir Philip Dawson)—a system which was later converted to third rail. It now looks as though there may be a reversion one of these days.

★ ★ ★

A picture reproduced in the *Eastern Daily Press* shows a windmill at Potter Heigham (Norfolk). The caption says: "Though its sails no longer turn, this mill at Potter Heigham is still working. Its motive power is now electricity." There's something odd about this when experiments are being carried out upon the possibilities of generating electricity from wind power.

★ ★ ★

"Eastern Electricity Bulletin," No. 71, which has just reached me, is a special fashion issue. It depicts Miss Oxland, of the Norfolk Sub Area, displaying the new standardized overall which the Eastern Electricity Board has produced for its women housecraft advisers, demonstrators and service centre assistants. I don't know what the ladies concerned think about standardization, but to me the garment looks neat and serviceable—and even attractive. But while the design may be acceptable, the service centre assistants may not agree that the colours should match the standard service centre colours rather than their hair or complexions.

★ ★ ★

Some of the English Electricity Boards have adopted attractive names for their Sub-areas, e.g., Chilterns and Fens (Eastern Area), but most are strictly geographical or numerical. There is a certain romanticism in the naming of some of its areas by the North of Scotland Hydro-Electric Board, where strict topographical definition has to be avoided. Among the names shown in a new map of the Board's system are North and South Caledonia, Dalriada and (particularly romantic) Lorne and the Isles.

★ ★ ★

I have referred on past occasions to the difficulty of finding homes for the staffs of new power stations. The North of Scotland Hydro-Electric Board is solving the problem (partly, at any rate) by obtaining prefabricated timber houses from Finland. The first batch arrived a week or two ago; they are intended to house the permanent staff at Campbeltown and Ardrishaig. This is the justification for the headline "Wooden Houses for Power Chiefs" which appeared recently in a Scottish paper.

★ ★ ★

Memories of W. S. Gilbert's Captain Reece stirred within me when I read of the equipment of the destroyer *Daring*, launched recently. Capt. Reece's *Mantelpiece* was full of "home comforts," but could not have been superior to the new destroyer, which has centralized electric cooking apparatus, an electric laundry, modern bathroom facilities, and "the maximum of mechanical devices for cleaning the ship."

Personal and Social

NEWS OF MEN AND WOMEN OF THE INDUSTRY

THE Examining Board has announced its decision in connection with the W.E. Highfield Shield Competition, 1948-49, held under the auspices of the Association of Supervising Electrical Engineers. The prizes are awarded for the best papers on subjects dealing with the electrical industry and/or the Association. The Examining Board for the 1948-49 competition, composed of Mr. A. G. Ramsey, president, Mr. H. Nimmo, immediate past-president, Mr. L. R. Perkins and Mr. S. H. Harding, members of the Executive Council, made the following awards:—First prize (£5 5s) and the Shield to **Mr. A. Carpenter,** Greenhithe, Kent, for his paper "The Utilization of Electricity in Quarries." Second prize (£3 3s) to **Mr. G. M. Dunbar,** Kalgoorlie, Western Australia, for his paper "Electric Power for the Fluorescent Lighting of Merchant Ships."

The *New Zealand Electrical Journal* reports that the Minister of Civil Aviation has appointed **Mr. R. J. Dippy,** O.B.E., B.Sc., A.M.I.E.E., to the post of controller of telecommunications in the Civil Aviation Branch of the Air Department. Mr. Dippy was assistant director of telecommunications development in the U.K. Ministry of Supply and is an authority on radio and radar aids to navigation.

Dr. Max Schiesser, who, as reported on page 353, has been elected president of the International Electrotechnical Commission, is managing director and vice-president of the Brown Boveri company, Switzerland. He was born at Uster, Canton of Zürich, in 1880, and studied at the Winterthur Tecnicum. In 1901 he joined Brown Boveri at Baden and left the company in 1905 to work in France, then with the Crocker-Wheeler Co. and New York Edison Co. in the United States. Returning to Switzerland in 1907 to rejoin Brown Boveri, he became successively chief test engineer and head of all the electrical engineering and test departments, making notable contributions to the development of rotary convertors, mercury arc rectifiers and switchgear. In 1937 the honorary degree of doctor of technical sciences was conferred upon him by the Swiss Federal Institute of Technology, Zürich. Dr. Schiesser has been president of the Swiss Electrotechnical Committee since 1939.

Dr. Max Schiesser

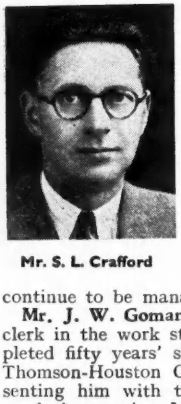
Mr. J. W. Angus, who as briefly reported in our last issue has been appointed managing director of Hipprum Wires, Ltd., was for nine years production manager with Pyrotenax, Ltd., Hebburn-on-Tyne, and joined Hipprum Wires in August, 1948, as general manager and chief engineer. In January last he was appointed a director of the company and he became chairman in February last, to which duties he has now added those of managing director.

Mr. J. W. Angus

A number of staff changes are announced by the British Welding Research Association. **Mr. R. G. Burt,** O.B.E., and **Mr. C. C. Bates** joined the technical liaison staff on 1st August. Mr. Burt, who holds the B.Sc.(Eng.) degree of Edinburgh University, and is a member of the Institution of Mechanical Engineers and the Institute of Welding, has for a number of years been on the staff of the Indian Stores Departmnt and latterly Deputy Director General (Inspection) of the Directorate General of Industries & Supplies. Mr. Bates, who is an associate member of the Institute of Welding and an associate of the Institute of Engineering Inspection, has served with Underwater Welders & Repairers, Ltd., and for a number of years was on the technical inspecting staff of the A.I.D. Ministry of Aircraft Production. **Mr. J. G. Ball** left the Association on 1st August to become Principal Scientific Officer of the Ministry of Supply at the Atomic Energy Research Station, Harwell. He had been with the Association for over eight years and was largely responsible for the establishment of

the Association's metallurgical laboratories. **Mr. A. Barker,** who has been secretary of the Association since 1946, is leaving at the end of August to take up the appointment of assistant director of the Federation of Boot & Shoe Manufacturers.

In our last issue we reported that **Mr. S. L. Crafford** had been appointed manager of the Colchester branch of W. T. Henley's Telegraph Works Co., Ltd. This branch has hitherto been associated with the company's Norwich branch, Mr. Crafford being the representative covering the Colchester area. **Mr. J. Newton,** who for many years has been in charge of both of these branches, will continue to be manager at Norwich.



Mr. S. L. Crafford

Mr. J. W. Goman, chief goods receiving clerk in the work stores, Rugby, has completed fifty years' service with the British Thomson-Houston Co., Ltd. When presenting him with two Berkeley chairs to mark the occasion, Mr. H. L. Satchell, director, and manager, Rugby works, recalled that Mr. Goman joined the company in 1899, working in the stores and workshop at Bankside, London. Soon after the Rugby works was built Mr. Goman was transferred there.

Mr. G. N. Wright, M.I.E.E., well-known throughout the country as chief electrical engineer of the London Power Co., has retired. Mr. Wright commenced his career as a pupil at the Nuneaton electricity works, and attended evening classes at Armstrong College, Newcastle-on-Tyne. He joined the Newcastle Electric Supply Co., Ltd., in 1904 as a junior engineer, and from there went to the Cleveland and Durham Electric Power Co., Ltd., with whom he subsequently became transmission engineer and technical assistant. While with the Cleveland and Durham Co., he was chairman of the Tees-side Sub-Centre of the Institution of Electrical Engineers (1920). In 1924 Mr. Wright came south to join the County of London Electric Supply Co., Ltd., as electrical clerk of works, during the period of the construction of the first section of the Barking power station. He commenced his association with the London Power Co. in 1926, as distribution engineer, and later became assistant chief electrical engineer, and upon the death of Mr. H. A. Ratcliff in 1938, was appointed chief electrical engineer, having complete control of all the electrical engineering work of the company during the war years, and during the difficult post-war years up to vesting date. While with the London Power Co. he was responsible for the design and construction of the original 22 kV network of the company. Mr. Wright has been a member of the E.R.A. Council.

Mr. F. R. M. de Paula, O.B.E., F.C.A., has been appointed a director of the Brush Electrical Engineering Co., Ltd. Mr. de Paula is also a director of Electric and Musical Industries, Ltd., and is on the Grand Council of the Federation of British Industries.

On his return from India, **Mr. R. L. Chantrill** has been appointed chief technical engineer of the British Thomson-Houston Export Co., Ltd. Mr. Chantrill has had long experience of project work, and for some years was director and chief engineer of Associated Electrical Industries (India), Ltd., which position he has now relinquished.

Competed for annually by the London Students' Sections of the Institutions of Civil, Electrical and Mechanical Engineers, the **Young Trophy** has this year been won by the Electricals. After winning the shooting competition, coming second in table tennis and third in soccer, the I.E.E. Students found the summer to their liking and beat both their opponents at cricket and at lawn tennis to win the cup with thirty points out of a possible forty.

Mr. F. C. Z. Crosse, B.Sc., A.M.I.E.E., who, as we reported in our last issue, has been appointed a director of Measurement, Ltd., a subsidiary company of Parkinson & Cowan, Ltd., has been associated with this group for about fourteen years.

His main interests are in connection with the export of all products manufactured by the group. Mr. Crosse is also a director and the manager of Parkinson & Cowan Group Exports, Ltd.

Mr. F. C. Z. Crosse

Obituary

Mr. E. Friedland.—The death occurred on the 27th July at the age of forty-seven, after a short illness, of Mr. E. Friedland, managing director of V. & E. Friedland, Ltd., of Macclesfield.

Mrs. H. Leason.—The death occurred on 7th August of Mrs. Lavinia Leason, wife of

Alderman H. Leason, J.P., A.M.I.E.E., chairman of the Midlands Electricity Consultative Council and former chairman of the N.W. Midlands Joint Electricity Authority.

Mr. W. D. Torry.—We learn of the death on 11th August at his home, Hatch End, Middlesex, at the age of sixty-one, of Mr. W. D. Torry, chief engineer at the Willesden Works of Lancashire Dynamo & Crypto, Ltd., from 1938 to 1948. Mr. Torry had been ill for nearly two years. The funeral was held at the cemetery of the Pinner Methodist Chapel on 17th August.

Mr. R. J. Jamison.—The death occurred on 11th August, after a short illness, of Mr. R. J. Jamison, Northern area sales manager of Simon-Carves Ltd. (Power Plant Department). Before joining Simon-Carves in 1945, Mr. Jamison was on the staff of Davidson & Co., Ltd., Sirocco Engineering Works, Belfast, in whose service he spent many years, both in India and at home.

Wills

Mr. E. A. Pinto, A.M.I.E.E., formerly with the General Electric Co., Ltd., Birmingham, previously chief assistant electrical engineer to United Shipyards, Ltd., Canada, who died on 27th May last, left £727 gross (£674 net).

Mr. W. K. Lewis, of 3 Dollis Parade, Totteridge Lane, N., late of Friern Barnet, electrical engineer, who died on 29th May last, left £7,909 gross (£7,006 net).

Mr. J. Milton, late chief inspector of signals and telephones, Great Western Railway, who died on 3rd March last, left £1,667 gross (£1,627 net).

Mr. G. W. King, Hove, retired electrical engineer, who died on 12th April last, left £10,804 gross (£10,525 net).

Mr. C. P. Osborne, a director of Blackburn, Starling & Co., Ltd., electrical contractors, etc., who died on 5th April last, left £12,275.

Mr. E. J. Pond, formerly Henley's Midland district superintendent, who died on 5th January, left £11,893 gross (£11,715 net).

Mr. A. N. Dixey, of Great Missenden, Bucks, retired electrical engineer, who died on 24th November last, left £15,516 gross (£15,460 net). He left £100 to the Benevolent Fund of the Institution of Electrical Engineers.

Mr. A. Feld, managing director of Wandleside Cable Works, Ltd., who died on 30th April last, left £22,136 gross in Great Britain (£21,952 net).

Buenos Aires Power Shortage

IT is reported by the *Review of the River Plate* (8th July) that "public attention was officially drawn to the strain on the capacity of local power stations in early June, when a decree was promulgated with the object of reducing the consumption of electric light by offices and shops in the Buenos Aires area, but for some time past consumers have been aware that the performance of their electrical equipment was falling short of accustomed standards. Flat-irons, according to housewives, take longer to heat, cakes come out of the oven unbrowned, while a 60-watt bulb, it is alleged, now gives no more light than had formerly been provided by one of 40 watts.

"Matters came to a head one morning last week when, following a series of minor fluctuations, electric clocks were observed to be no less than a quarter of an hour slow. Even more surprisingly (and quite contrary to the copybook maxim), the missing minutes were made up in the course of the afternoon, so that those who had corrected their clocks on observing the first error now found them to be a quarter of an hour fast. Next day the electricity company concerned published a statement attributing the errors to fluctuations in voltage due to overloading of the circuits and advising customers in future not to alter their clocks if they observed an error, as this would be corrected from the power house at the earliest opportunity."

The electricity supply authorities later explained that applications for exchange for the purchase of generating equipment had been held up for over a year while the number of consumers in Buenos Aires is constantly increasing. If all went well it was hoped that by early January the situation would be normal.

Snowy River Plans

THE new authority for the Australian Snowy River project is setting up offices in Sydney, and the Commissioner (Mr. W. Hudson), whose salary has been fixed at £4,500 per year, will have two assistant commissioners. Applications are now being called for these posts, the salary for which is £2,500 per year and the term of initial appointment six years. One will be a civil engineer and the other a mechanical or electrical engineer. A secretary is also required (salary £2,250 per year). The Minister for Post-War Reconstruction (Mr. Dedman) is at present visiting overseas countries in connection with the placing of contracts to the value of several million pounds for the scheme.

Irish Telephone Project

A CONTRACT has been awarded to Standard Telephones and Cables, Ltd., by the Department of Posts and Telegraphs, Eire, for the construction of new trunk telephone circuits between the main centres of the country, using the most modern type of high-frequency coaxial cable, including the installation of the cable and terminal and repeater equipment.

A cable consisting of two coaxial "tubes," surrounded by a number of pairs of wires for operation at voice frequency will be laid from Dublin to Cork via Port Laoighise and Limerick with a branch to Waterford. The frequency band which will be available on this cable will permit of a maximum of 600 circuits on the coaxial tubes, exclusive of voice-frequency circuits provided by the surrounding pairs. Terminal equipment for the translation of the voice-frequency switchboard connections to the required positions in the frequency spectrum of the cable will be installed at all of the above centres. In this terminal equipment, the long-distance circuits from the switchboard are first grouped in sets of twelve, then five groups of twelve circuits are combined into one "supergroup" of sixty circuits. Finally, the supergroups are each translated to their appropriate frequency bands on the cable.

Space Economy

A new method of mounting line transmission equipment has been introduced by S.T. & C. since the end of the war. By the extensive use of miniature components the space occupied has been reduced in some cases to one-quarter; by the use of jack-in apparatus panels maintenance work is greatly facilitated and the enclosure of a large part of the circuit elements in sealed containers has provided better protection against tropical conditions.

Interconnection between succeeding sections of the cable will be effected by routing the circuits in blocks of sixty or twelve, so that, for through circuits, there will be no need to bring the incoming channels of communication down to voice frequency. The most heavily loaded section of the route will be between Dublin and Port Laoighise, where a total of six supergroups will be working initially, giving some 300 circuits. Of these, some will be routed through Limerick to Cork, others will terminate in Limerick, and some will be branched off at Port Laoighise to Waterford.

Screened pairs for broadcast transmissions will be provided in all sections of the new cable, including a branch which will run from Port Laoighise to Athlone. This branch will not be provided with coaxial "tubes" but will comprise a number of pairs of wires for operation at voice frequency. The voice-frequency circuits surrounding the coaxial "tubes" on the main cable are intended for connection to towns on the route between the main centres, which will thus be provided with additional telephone circuits also.

For some years part of the trunk telephone system in Eire has been equipped with a modern system of long-distance dialling, developed and installed by S.T. & C., which permits a provincial operator to set up a call to a Dublin subscriber without the intervention of an operator in Dublin. The contract includes the provision of similar facilities using apparatus of an improved design, on the circuits to be provided by the new cable.

Atmospheric Pollution

THE annual report of the Ministry of Health chief inspector of alkali, etc., works (i.e., heavy chemical manufacturing establishments) shows that in 1948 registered works of these kinds numbered 1,083 in which 1,766 separate processes were in operation. The report (H.M. Stationery Office, 9d), deals mainly with smoke abatement and pollution of the atmosphere by the emission of noxious gases.

Half the eighty complaints investigated last year concerned unregistered processes, among which is electricity generation. Consultation, outlined in the 1947 report, between the inspectorate and the Ministry of Fuel and Power continues concerning the planning of new power stations and major extensions of existing plant.

Further complaints were made last year about three power stations, all in the same area; old boilers in two of them are to be replaced while the third, which is causing the inspectors some uneasiness, is being converted to oil fuel. Flue-gas washing at the Battersea power station has continued on a limited scale; when the washer now being reconditioned is back in service, later this year, the other will be overhauled.

Remedial steps recommended by the inspectors for industrial boiler plants include the provision of electrical precipitators in several cases. Precipitators are in use at many cement works; the dust problem is most serious in the Thames-side area wherein is produced half the cement made in this country. The companies are doing their best, but are severely hampered by shortages of steel and electrical gear.

The chief inspector for Scotland reports that electrostatic precipitation appears to be the only practicable means of arresting dust arising during the preparation of ore for extracting the metal.

I.E.C. in Italy

COUNCIL DECISIONS AT THE STRESA MEETING

At its meeting in Stresa on 13th June the Council of the International Electrotechnical Commission elected Dr. M. Schiesser (Switzerland) as president in succession to M. E. Uytborck (Belgium) whose term of office expired. Tribute was paid to M. Uytborck for helping to re-establish the work of the Commission after the war.

The meeting of the Council was followed by meetings of six Advisory Committees, and, in spite of the fact that the period unfortunately clashed with that of the Electrical Power Convention in Torquay, a strong British delegation of 25 members went to Stresa as representatives of the British Standards Institution, whose Electrical Industry Standards Committee is the British National Committee of the I.E.C. The delegation included representatives of the British Electricity Authority and Area Boards, British Railways, the Institution of Electrical Engineers, consulting engineers, British Electrical and Allied Manufacturers' Association, Electrical Research Association and the Institute of Petroleum.

Revision of Statutes

The Council approved a revision of the Statutes of the I.E.C. Dr. P. Dunsheath was elected hon. treasurer, an office which under the new Statutes replaces the former office of hon. secretary. Chairmen of Advisory Committees were elected, including Mr. C. A. Martin (B.T.H. Co., Ltd.), Committee No. 2, rotating machines; Mr. J. E. Calverley (English Electric Co., Ltd.), Committee No. 22, electronic devices; and Mr. R. W. W. Sanderson (General Electric Co., Ltd.), Committee No. 35, dry batteries. A subcommittee was appointed to consider plans for celebrating the jubilee of the I.E.C. in 1954, the British member of this Sub-Committee being Mr. P. Good (B.S.I.).

Advisory Committee No. 1 (nomenclature) considered the steps to be taken to prepare a revised edition of the International Electrotechnical Vocabulary, the first edition of which was published in 1938. It was decided as an interim measure to provide for a photolithographed reprint of the existing vocabulary, pending the publication of a revised and extended edition, in which the definitions will be in English and French. The list of technical terms will be given also in German, Italian, Spanish, Swedish and a Slav language, the latter to be decided by agreement between the Czech, Polish and Russian National Committees. The use of Esperanto is to be discontinued. Detailed arrangements for allocating the work of the revision among the various National Committees was drawn up by a sub-committee under the chairmanship of Prof. R. O. Kapp (London University) and the United Kingdom agreed to undertake the preparation of the sections dealing with telecommunications and servo-mechanisms.

A.C. Definitions

Advisory Committee No. 8 (voltages and insulators) dealt with the difficult question of definitions relating to a.c. systems. In the past much confusion has existed due to the indiscriminate use of such terms as nominal, working, rated operating and maximum voltages as applied to systems and to apparatus. The committee has now drawn up a list of definitions which will be submitted to the National Committees for final approval. This committee also reviewed the list of standard voltages for a.c. systems and extended the list up to 400 kV.

Impulse Testing

Sub-Committees on impulse test and on sphere gap calibrations were reappointed under the chairmanship of Dr. S. Whitehead (Electrical Research Association). Consideration was also given to a draft international specification for porcelain insulators for overhead lines and for high-voltage bushings, preliminary work on both these subjects having been done before the war.

The Council, on the recommendation of the British delegation, has decided

that in future the work of Committee No. 8 should be divided between two Advisory Committees, one dealing with standard voltages and currents and the other with high voltage testing, insulators and bushings.

Oil Ageing Tests

Advisory Committee No. 10 (insulating oils) met under the chairmanship of Prof. Weiss (France), who is the sole remaining member of the original committee which began its work 25 years ago. The main subject on the agenda was that of an international ageing test for transformer oil. In the past this subject has presented considerable difficulties, largely owing to the divergent types of oils in use internationally, but it became evident at the meeting in Stresa that opinions did not now vary unduly widely, this being not only the result of the continued period of practical experience, but also of the more fundamental studies, which have been made during the last 15 years of the reactions involved in the oxidation of mineral oils.

It was agreed that it would be necessary to continue laboratory work and with this in view a permanent sub-committee is to be formed, its first task being to evolve a single apparatus which will allow a study of the influence of the variables in the preferred existing tests, each of which at present involves different types of apparatus. Comparisons will be made in each of the participating countries of the relative ratings of oils by their existing methods, and by the use of the common apparatus, when this has been decided upon.

Oil Circuit Breakers

Advisory Committee No. 17 (switchgear) was concerned with the revision and extension of the I.E.C. specification for oil circuit-breakers which up to the present has been restricted to rules for short-circuit conditions. The Committee is now giving consideration to the extension of the specification to cover rules for normal load conditions, strength of insulation, selection of circuit-breakers and their maintenance service. Comprehensive proposals covering most of the ground had been submitted by the British delegation and they formed the main basis for discussion at the meeting in Stresa.

The work of this Advisory Committee is closely allied to that of a committee set up by the Paris High-Tension Conference (C.I.G.R.E.) and it has therefore been decided that the next meeting of the I.E.C. Committee will be held in Paris in 1950 to enable the delegates to attend both the I.E.C. and the C.I.G.R.E. meetings. In the meantime sub-committees of experts have been formed to study various technical problems referred to them by Committee No. 17.

Electronic Convertors and Rectifiers

Advisory Committee No. 22 (electronic devices) under the chairmanship of Mr. J. E. Calverley, reviewed a draft specification for ionic convertors, which had been prepared by the Swiss secretariat as an elaboration of the draft which was under discussion at the last meeting which took place in Torquay in 1938. Arising out of this discussion it was felt that the title of Committee No. 22 was too wide in its scope. A suggestion that it should be amended to "mercury arc rectifiers" was agreed to in principle and the secretariat was asked to submit for future consideration a proposal for the revision of the Committee's title and terms of reference.

Advisory Committee No. 28 (co-ordination of insulation) is of particular importance, as its decisions affect the work of several other Advisory Committees, in particular those dealing with switchgear, transformers, insulators and cables. The programme of work includes the following items: vocabulary, surge test values, power frequency values, universal table of insulation classes, lightning arrestors. Sub-Committees were formed to deal with each of these items and their recommendations will in due course be submitted to the National Committees for consideration.

The general arrangements for the technical meetings were admirably carried out by the Italian Electrotechnical Committee and they, together with the natural beauty of the surroundings and the hospitality generously extended to the delegates, combined to make the meetings a pleasure and a success. At the conclusion of the meetings many of the delegates participated in a three-day excursion to see some of the hydro-electric plants in Northern Italy.

The Sign of Reactive Power

America Abandons Common Convention

By "SIGMA"

THERE are two kinds of electrical circuit having the property that, when they are connected to an a.c. source, the time average rate of energy consumption in them over an exact number of cycles is zero. The first is a resistance-free inductor and the second a resistance-free capacitor. If such circuits are connected to the same source of supply, the currents in them will always be in opposite directions. The product of r.m.s. current and voltage in such a circuit is called the reactive VA, or the VAr; it is also referred to as the reactive power.

When a circuit takes power from an a.c. source in the sense that there is energy consumption proportional to time, power is said to flow from the source into the circuit. Inductive reactive power may therefore be said to flow into an inductor and capacitative reactive power into a capacitor; but, as the current in the capacitor is always opposite in direction to that in the inductor, capacitative reactive power may be considered the reverse of inductive reactive power. The flow of reactive power into an inductor may be considered normal, or positive, in which case reactive power must be considered as flowing back to the source from a capacitor. Alternatively, capacitative reactive power may be considered normal in direction, or positive.

For many years it has been the convention in America to regard capacitative reactive power as having a positive sign, but a committee of the American Institute of Electrical Engineers has recently recommended that this idea should be abandoned and that inductive reactive power should be regarded as positive. According to the prevalent convention, therefore, an inductor takes reactive power from an a.c. source, while a capacitor returns it.

It would seem that the correct sign to be given to inductive reactive power would be fixed according to elementary a.c. theory. This is not the case and a short discussion of the ambiguity may be of interest.

If an alternating voltage of sinusoidal wave form and instantaneous value $v = V_m \sin \omega t$ is impressed on a circuit having resistance R and impedance Z, the resulting current will have an instantaneous value of

$$i = I_m \sin(\omega t \pm \phi) \text{ where } \cos \phi = \frac{R}{Z}.$$

The average value of the power dissipated in the circuit will be $\frac{1}{2} I_m V_m \cos \phi = IV \cos \phi$, where I and V are r.m.s. values. Average power, then, is the product of the voltamperes IV and the cosine of the angle of phase difference between current and voltage. As this angle cannot exceed 90 deg, the cosine is always positive. The power flow is therefore always positive.

If the reactive power is defined as IV multiplied by the sine of the angle of phase difference, then, as this angle is negative or lagging for an inductive impedance, its sine will be negative, so the reactive power flow into an inductive circuit will be negative. With a capacitative impedance, the phase angle is positive and the sign of the reactive power is also positive.

However, if we express the instantaneous value of the current as $I_m \sin \omega t$ and the voltage as $V_m \sin(\omega t \pm \phi)$ the latter, leading in an inductive impedance, will have a positive phase angle and the product of IV and the sine of the phase angle will be positive. This makes the flow of reactive power into an inductive circuit positive in sign.

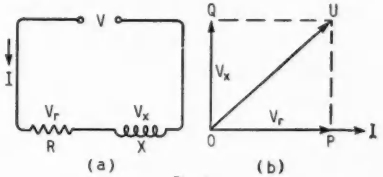


Fig. 1

This matter can be considered in

another way. The actual power and the reactive power components can be objectively segregated in two kinds of circuits. Fig. 1a represents a non-inductive resistor in series with a resistance-free inductor connected to an a.c. source of r.m.s. voltage V and taking an r.m.s. current of I amperes therefrom. The voltage drops in the resistor and the inductor are respectively V_r and V_x. The whole of the actual power component in this arrangement is absorbed in the resistance, so its value is IV_r watts. Similarly the whole of the reactive power component is absorbed in the inductor and this component has the VA value IV_x.

As the expressions for actual and reactive power have the common factor I and as V leads V_r in phase by 90 deg, the actual and reactive power can be represented by a vector diagram (Fig. 1b). The power vector OP is in phase with the current vector OI and the reactive power vector OQ leads the OI vector by 90 deg. The resultant of OP and OQ, or OU, is the vector of the voltamperes; OP is sometimes said to stand for the real power, and OU for the vector power. According to the rules for vector algebra, if OP is real, then the reactive power is represented symbolically by jIV_x. The reactive power absorbed in an inductor is therefore positive.

The second kind of circuit in which the actual and the reactive power consumptions are segregated as indicated in Fig. 2. In this instance a resistor is connected

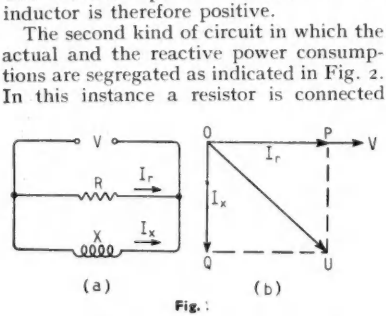


Fig. :

in parallel with an inductor to an a.c. source of V volts, while I_r and I_x are the currents in the resistor and the inductor branches respectively. All of the actual, or real, power I_rV is absorbed in the resistor and all of the reactive power I_xV is absorbed in the inductive branch. The power is represented (Fig. 2b) as a vector OP in phase with the voltage vector OV and the reactive power by a vector OQ lagging OV by 90 deg, since I_x is in lagging quadrature with the voltage. Here reactive power, regarded as a vector, is represented symbolically by $-jI_xV$.

The preceding three paragraphs are a summary of the explanation given in the report of the A.I.E.E. Committee on the sign of reactive power. Some readers may see in it merely an elaboration of the obvious fact that, if the current in an inductive circuit lags the applied voltage, then the voltage must lead the current. The validity of treating power and voltamperes as vector quantities is also open to question. If two or more alternating currents are superposed in the same circuit then the resultant current can be calculated by treating the components as vectors if, and only if, these components are sinusoidal and of the same frequency. In this sense alternating currents can be regarded as vectors, and so, in a similar sense, can alternating voltages.

However, the voltamperes in two or more circuits can be regarded as vectors only if they have a common current or a common voltage, and the vector property is essentially that of a voltage or current. Power, on the other hand, is essentially scalar and it is in no sense vectorial. If, for instance, the temperature of a mass of water is raised by two or more electric heaters, the rate at which heat is received is represented by the arithmetical sum of the power consumptions of the heaters, irrespective of the nature of their supplies. It is true that power and VA in an a.c. circuit can be represented graphically by the sides of a right-angled triangle, but although a vector diagram may be a right-angled triangle, every such triangle is not necessarily a vector diagram.

To regard power as a vector quantity seems to be as erroneous as the statement sometimes made by responsible writers that a wattmeter in an a.c. circuit takes into account current, voltage and phase angle. The instantaneous deflecting torque of the instrument is proportional to the instantaneous product of volts and amperes, the reading of the instrument being proportional to the mean value of this product under all conditions. Reactive power or lagging VAr is also an essentially scalar quantity, being propor-

tional to the mean value of the energy in the magnetic field produced by the current. The vector diagrams of Figs. 1 and 2 are really those of the active and reactive components of a sinusoidal voltage in the one case, and of the active and reactive components of a sinusoidal current in the other.

Most practical engineers will consider that the revised convention recommended by the A.I.E.E. to consider inductive reactive power as positive is a rational and sensible one, notwithstanding the anomaly that the algebraic expression for a lagging reactive current component will have a positive "j" factor. According to this convention, as an induction motor receives electrical power for conversion to mechanical power, so it receives reactive power for the provision of the alternating magnetic fields in the machine. Again, as an increase of the steam supply to the prime mover of a synchronous generator increases the electrical power output, so an increase of the excitation increases the reactive power output.

When the charge for a public supply is regulated by a power factor tariff, the consumer, in effect, pays for both actual energy and kVAr. Further, as power flowing from a source through a line with resistance produces voltage drop, so does reactive power flowing from the same source through a line with inductive reactance.

Finally, an over-excited synchronous motor, like a synchronous generator, is a generator of reactive power and this reactive power output, used by induction motors of the same installation, reduces the reactive power taken from the main supply and so raises a lagging power factor. An interesting corollary of the convention is the rule that with lagging power factors the directions of actual and reactive powers are the same; with leading power factors these directions are opposite.

NEW BOOKS

Basic Electrical Engineering. By G. F. Corcoran. Pp. 449, figs. and index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 27s in U.K.

The title of this work may be a little misleading. It is not an elementary textbook on electrical engineering, but a fairly advanced treatise on basic electrical theory considered from the practical standpoint, such as is wanted by those who intend to pursue their studies beyond the pass degree standard. A sound knowledge of the elements of the calculus is assumed and the reader will have to familiarize himself with the author's symbolism.

After an opening chapter on units and dimensional theory, the author passes on to electrical circuit theory and the solution of network problems. The middle chapters of the book deal with electric and magnetic fields, with electro-magnetic theory and mechanically generated voltages and with inductance and capacitance. The final chapters deal with electrolytic and non-linear circuits. The author uses the M.K.S. system of dynamical units and throughout the book strict attention is paid to the dimensions of the various quantities encountered. It is therefore rather surprising that no account is given of the attempts to rationalize the theory of the dimensions of electrical quantities by the choice of a fourth dimensional entity.

The style of treatment although formal and mathematical is lucid, the diagrams are excellent, and the theory is illustrated by a number of fully worked numerical examples. There is an extensive selection of problems for solution and the utility of the book, to the private student particularly, would be increased if the worked solutions to these problems could be issued in a separate volume. This is an excellent book for the advanced student. It is not easy to read, but whoever works through it conscientiously will lay a firm foundation upon which a superstructure of specialized study can be built.—G. W. S.

Power Capacitors. By R. E. Marbury. Pp. 205, figs. 122, index. McGraw-Hill Publishing Co., Ltd., Aldwych House, Aldwych, W.C.2. Price 21s in U.K.

This American book begins with a dissertation on capacitor materials and their characteristics, presenting a very clear picture of the factors which have been responsible for the evolution of the power capacitor over a period of about thirty years.

This is followed by a chapter on the rating, design and manufacture of capacitors, with a short preamble introducing the specialist's rating unit, the kVAr, which is considered to be so much more useful than capacitance when the system voltage and frequency are known. "For a given kVAr rating the capacitance in microfarads varies inversely as the square of the voltage and

directly as the frequency in cycles." Particulars of the manufacturing technique adopted by the author's principals in Pittsburgh are freely given and well illustrated.

Applications are considered with complete detachment whether the issue be a matter of policy, economics or engineering. It is of interest to note the wide range of applications, apart from power-factor correction. Here are but a few: surge generation, surge protection, rectifier filters, dust precipitation, induction furnaces and electronic heating, energy-storage for welding, X-ray, photographic and fog-light purposes. The influence of each different application upon design is well shown.

Throughout the whole work the treatment is essentially practical. It covers the choice and use of fuses and breakers and gives wise counsel on installation and maintenance. The arrangement is logical, the subject-matter explicit, and the presentation excellent, but the index could be very much improved.—W. D. O.

Questions and Answers on Electronics. By E. Molloy. Pp. 128, figs. 65, index. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 5s.

This pocket-sized reference book outlines the basic fundamentals of electronic theory and the principles involved in the construction of the various types of electronic equipment and instruments, the information being presented in the form of question and answer. To mention a few: the cathode-ray tube, television, radar, high frequency heating and the electron microscope are typical of the developments which are covered. The book is well produced and is likely to prove useful to students and all those who wish to familiarize themselves with the terminology and equipment used in electronic engineering.—R. P.

Principles of Electricity and Electromagnetism. By G. P. Harnwell. Pp. 670, figs. and index. (Second edition.) McGraw-Hill Publishing Co., Ltd. Price 36s in U.K.

This book is intended for students who have already had an elementary course in physics and are familiar with the elements of differential and integral calculus. The experimental aspect of the subject is made the basis of the treatment, and the combination of classical theoretical and modern experimental treatments is well suited to the present-day requirements of both the physicist and the light current engineer.

The scope is wide, with chapters on transmission lines, valve theory, and electromagnetic machinery in addition to the usual classical subjects. Modern vector notation is used throughout and this, as well as other topics, is clearly dealt with in a mathematical appendix.

This new edition (the first edition was published in 1938) has been brought up to date by the addition of many new sections, particularly on electronics and the electrical aspects of atomic physics. Examples of these are the betatron and synchrotron, the thermistor, and propagation in rectangular wave guides. References are given throughout to books for further study and, particularly for the more modern topics, to original papers. Unfortunately the latter give a quite unbalanced picture of the locale of recent scientific work, the only British (or indeed non-American) paper quoted of date later than 1932 being one by Griffiths on ferromagnetic resonance. This isolationist touch may also account for one British journal being referred to indifferently as *J.Inst.Elec.Eng.*, *Inst.E.E.* and *J.I.E.E.*, whilst references to American literature are always meticulously correct.—H. R. L. L.

Problems Have No Sex. By Caroline Haslett, D.B.E., Companion I.E.E. (Pp. 118.) English Universities Press, Ltd., 34, St. Paul's House, Warwick Square, London, E.C.4. Price 6s.

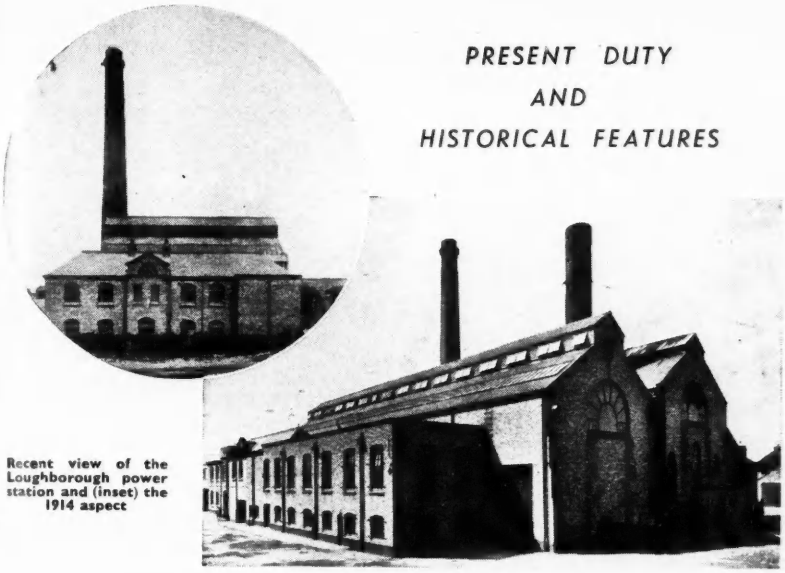
It is the aim of the authoress (who is a living example of the truth of her contention) to show that in the modern world women are as capable as men of grappling with the problems of society. Given the same training they are not inferior to men and any deficiency in "brawn" is surmountable with the aid of machines.

Dame Caroline examines the stereotyped objections to the "intrusion" of women into industry and professions and either explodes them or explains why, so far, women have not made headway in certain directions. She fairly admits that all the blame does not fall upon the males; women themselves have been slow to realize their capabilities and opportunities.—J. H. C.

Bezugsquellen-Lexikon für die Schweizerische Elektrizitäts Industrie. Pp. 405 + 84. Fritz Lindner Verlag, Zürich.

This directory of the Swiss electrical industry begins with a short section on the various societies and authorities concerned in this field and sets out a classified list of firms operating in the electrical industry and trade, including the retail trade and auxiliary industries. A section on electricity supply undertakings gives details of supply for all Swiss towns with more than 1,000 inhabitants. There is also an alphabetical list of these firms and a buyers' guide classified in French and German according to 2,000 items. The volume has evidently been edited with care, but the significance of the code numbers appearing after most of the entries is not explained.

PRESENT DUTY
AND
HISTORICAL FEATURES



Recent view of the Loughborough power station and (inset) the 1914 aspect

Loughborough Power Station

WHILE the former municipal generating station at Loughborough is unable to compete with modern plant in respect of thermal efficiency and coal consumed on the lb/kWh basis, it certainly can claim to hold its own so far as instant availability for service and cleanliness are concerned.

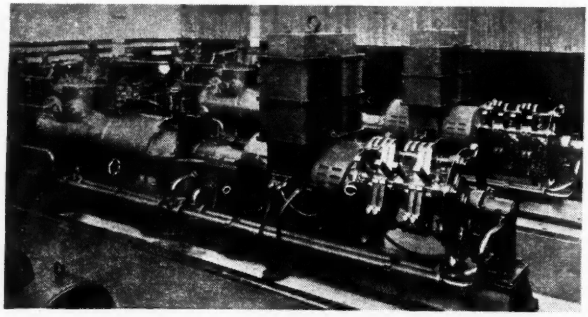
This Leicestershire power plant of 5,550 kW now belongs, essentially, to the "peak load" group within the East Midlands Division of the B.E.A. There is no record of any plant breakdown of sufficient seriousness to have prevented the local demand being satisfied before the establishment of the national grid system. The station was fully loaded during the winter months until 1935 when it ceased to generate until August, 1939; it then resumed continuous operation for about six months before being again shut down until 1943. Since that year the station has been continuously available for service and has never failed to respond to the grid control engineers' call for maximum output.

Credit for such prompt readiness and the tidiness that is typical of the whole installation is due to the staff and superintendent, Mr. H. K. Spencer, who has been associated with the station since 1922 and has occupied his present position since 1928, when Mr. Pausey left to take up a similar post at Wallasey. Thus this station has had only two superintendents during its 45 years of service.

In contrast thereto is the number of borough electrical engineers who served the former Corporation Electricity Department. The first to be appointed in 1904 was Mr. W. H. Allen and he was succeeded in 1915 by Mr. R. B. Leach, who remained until 1927. He was followed by Mr. G. J. Hollyer, previously deputy borough electrical engineer at Walthamstow, who resigned in December,

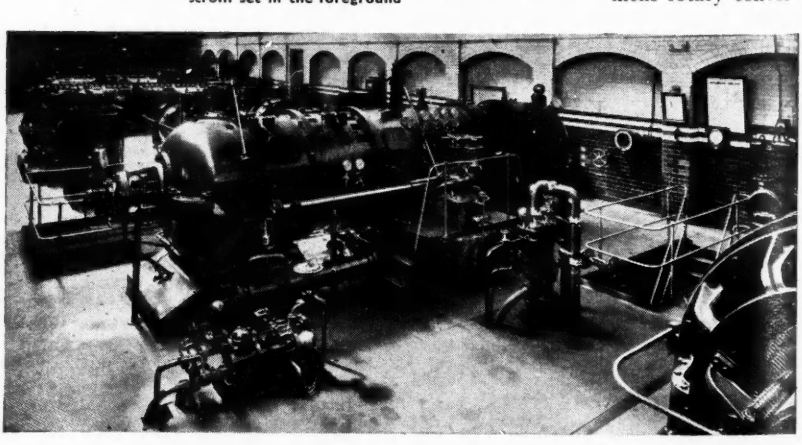
1929, to take up a similar post at Torquay where he now is manager of No. 4 Sub-Area (West Devon) of the South Western Board. His successor was Mr. S. H. Fowles, from Ilkley, who stayed until 1932 when he moved to the borough of Heston and Isleworth where he is now Heston district manager, Southern Electricity Board.

Generation commenced in November, 1904, on the present site adjoining the Loughborough Navigation Canal from which water is extracted for condenser cooling. Steam turbines were installed at the outset. The two original d.c. sets, each of 250 kW at 440/460 V and 2,800 r.p.m., were the first turbo-generators to be built by the Brush Electrical Engineering Co., Ltd., which was the first licensee in this country for the manufacture of Parsons turbines. The first two Danks dry-back return-tube boilers, working at 160 lb/sq in and 550 deg F, were fitted with Sugden superheaters and a Green's economiser. That plant sufficed for all local power and lighting requirements until the maximum load reached 400 kW in 1911, when the generators of the two turbo-sets were replaced by 350 kW machines.

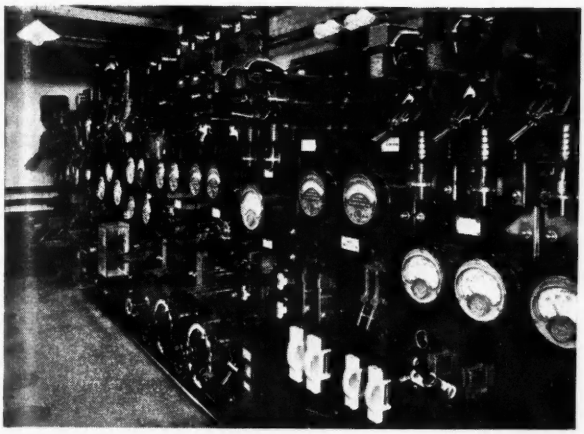


The two original Brush-Parsons d.c. 250 kW turbo-generators first commissioned in 1904

Below:—The turbine room to-day showing the 3,000 kW Brush-Ljungstrom set in the foreground



At the time of the second extension in 1914 a change-over to the a.c. 50 c/s system was made, a three phase Brush-Ljungstrom turbo-alternator of 1,000 kW at 660 V and 3,000 r.p.m. being installed with Brush condensing plant, together with a compound-wound Siemens rotary converter of 500 kW at 1,000 r.p.m. and a 500 kVA Brush transformer. A water-tube Clarke Chapman boiler of 12,500 lb/hr at 210 lb/sq in and 750 deg F was added at the same time, using underfeed



Low voltage switchboard with original panels erected in 1904 in foreground

stokers assisted by forced draught fans.

The wartime growth of the demand for power necessitated a third extension in 1917, so one of the earlier Brush-Parsons machines was removed to make room for a 1,500 kW Brush-Ljungstrom set with Brush condenser. Another Siemens convertor of 600 kW at 1,000 r.p.m. and a 675 kVA Brush transformer were provided and two Babcock & Wilcox water tube boilers of 22,000 lb/hr with underfeed stokers and forced draught replaced the original Danks boilers.

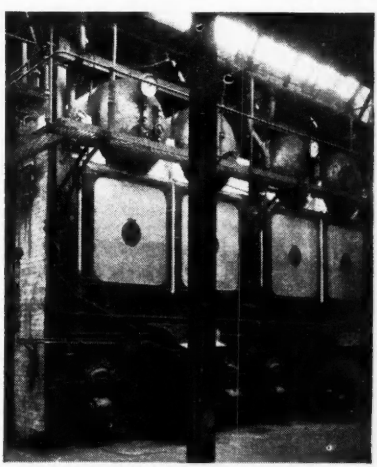
The fourth enlargement, in 1924, included a third Brush-Ljungstrom set, this time of 3,000 kW, with a Vickers-Spearing boiler of 25,000 lb/hr; another of 35,000 lb/hr was installed in 1928.

Incidentally the Electricity Commissioners' report on "Fuel Consumption" for the year ended March, 1921, placed the Loughborough plant in the first place in group "C" in its area and in third place in the same group for the whole country, the relevant figures being 2.94 lb/kWh generated and the thermal efficiency 11.7 per cent.

A station that has occupied the same site for 45 years is not unlikely to house some curious pieces of plant. For instance the B. & W. boilers installed at Loughborough thirty-two years ago are fired in an unusual way, starting by hand for building up steam pressure to 50 lb/sq in to enable the automatic firing system to function. The operating principle is admission of steam to a cylinder to force a piston to make a feed stroke which, in turn, actuates a valve-operating rod to admit steam at the opposite end of the cylinder, thus forcing the piston back in the reverse direction.

On the end of the piston is a ram that forces coal into the retort on the forward stroke, while the backward stroke allows coal to fall from the hopper. The speed of this operation is controlled by a dash-pot arrangement in the valve-operating mechanism. The dash pot is filled with water at boiler pressure, which is forced out by a plunger between the forward and backward strokes of the piston through a regulating valve, so adjusting the speed of the stroke.

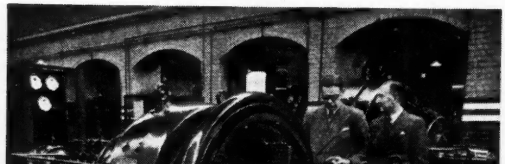
An unusual machine is the 500 kW



Two Babcock & Wilcox boilers installed in 1917 and still steaming during the 1948-49 winter

Siemens "rotary" installed thirty-five years ago. It consists of an ordinary shunt-wound a.c. to d.c. convertor with the addition of series field windings for inverted operation.

At the commutator end of the driving shaft is a Danielson convertor, a feature of which is that the pole pieces are devoid of field coils. Its slip rings receive a.c. (90 A at 12.5 V maximum) through a series transformer energized from the main 6.6 kV transformer while its d.c. output of 60 A at 17 V excites the additional series field windings of the main "rotary" when operating as an invertor.



Unusual Siemens 500 kW convertor - invertor. Mr. H. K. Spencer, station superintendent, is seen on the extreme right with divisional representative

Included on this machine is a booster with the rotor windings inserted between the main slip rings and armature. The field pole yoke of the booster is so designed that it can be rotated to retard or advance the positions of the poles in relation to the main machine field coils, thus permitting zero to ± 13 voltage regulation, the booster rating being 39.5 kVA.

For normal a.c. to d.c. operation the secondary output windings of the series input transformer are short circuited and a resistance is inserted in the d.c. output from the exciter. For inverting d.c. to a.c. the machine is run up to speed from the d.c. end through a tapped resistance and the speed adjusted by the main shunt field rheostat. Then, after synchronizing, the high a.c. output voltage is controlled by the shunt regulator in the booster field circuit.

Notes from France

From Our Paris Correspondent

OWING to the continued drought, Electricité de France has introduced systematic reductions in supply for all consumers. Domestic cuts were preceded by reduced allocations for industrial users, amounting to about one-tenth of the reductions in force last winter. This represented a reduction of 700,000 kW in the load.

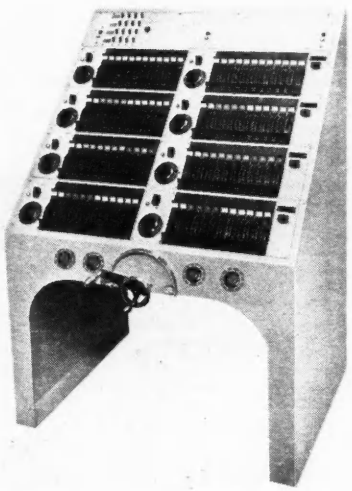
Since the last declaration made by M. Robert Lacoste, Minister of Commerce and Industry, further details have been given about the proposal to increase thermal generator equipment. The complementary programme will provide a further 260,000 kW from Electricité de France installations and 250,000 kW from Charbonnages de France. The total development envisaged is 550,000 kW. Expenditure will be about 20 milliard francs, of which 2 milliards may be spent this year. A large part of the equipment will probably be imported from America. The present programme offers a contrast with that put forward in the Monet Plan which stressed hydraulic equipment very heavily in order to reduce coal imports.

About 360 million francs is to be spent on the programme of modernization and development by the Société Thomson-Houston. At the Chauny plant new offices have been built and the manufacture of enamelled wire has been greatly extended. In addition a large holding has been acquired in the Société Flaba-Thomas, Bohain, to which the manufacture of insulated cables will be transferred from the present factory in Paris, which is too small. The company is also pursuing its activities in the electronics field. A particular effort is being made with short wave material. A plant has been acquired in Paris and is now being installed with a view to working with the Genevilliers and Asnières factories. Finally, the company is re-organizing and re-equipping specialized factories for the production of small apparatus, heating equipment and refrigerators and household apparatus.

Stage Lighting

Advantages of Control by Thyratron Valves

THE use of thyratron valves for the remote control of stage lighting has a number of important advantages over methods hitherto employed utilizing wire-wound resistances. Unlike the latter, which control the current, the thyratron valves vary the intensity of the lighting circuits by regulating the voltage: the loads on the lighting circuits can be anything from zero to the maximum capacity of the control without affecting the voltage / dimmer travel ratio. A few days ago we had an opportunity of seeing a demonstration of equipment which the Strand Electric & Engineering Co., Ltd., has developed incorporating this new device.



Desk type control (48-way) with duplicate panel for pre-setting

Probably the most striking feature of the apparatus is the compactness of the control desk. As the components handle only the control and not the lighting load, not only can the control panel be installed in small spaces which cannot accommodate the ordinary type of switchboard but also one operator can manipulate many more circuits than is possible by other methods.

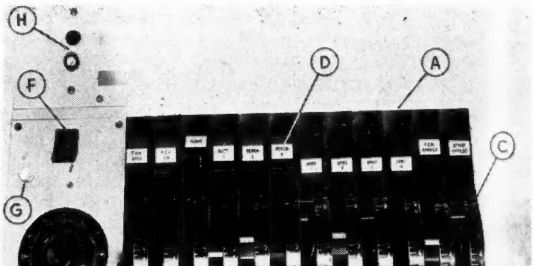
The design of the control desk preserves the standard layout and method of operation now in common use, but whereas spacing of the dimmer controls on the normal board is at about 4in centres, that of the new Strand unit is at 1in centres—of special importance in view of the tendency for lighting effects to become ever more elaborate.

The overall measurements of the complete desk control equipment which we were shown, a 48-way unit with duplicate panel for pre-setting, were 4ft 6in high, 36in wide, and 30in deep, the panel face itself being 3ft square. The nature of the electrical circuit renders the duplication of the control panel a simple matter, the change - over between the two halves of the board being made by a grand master control.

This signifies that while either panel is in use the switches and dimmers on the other may be set up to meet future requirements without interfering with the lighting in use until the change-over is made and the intensity of any or all circuits can be varied to any other required intensity by the operation of a single control. For rapid operation the change-over from one panel to the other is made by a simple lever: for slow work there is a hand wheel. The degree and direction of change can be selected at leisure in advance. For collective operation dimmers may be interlocked electrically, so that proportional voltage regulation is assured no matter how many circuits are controlled at once, and no matter what may be

the settings of the individual dimmers.

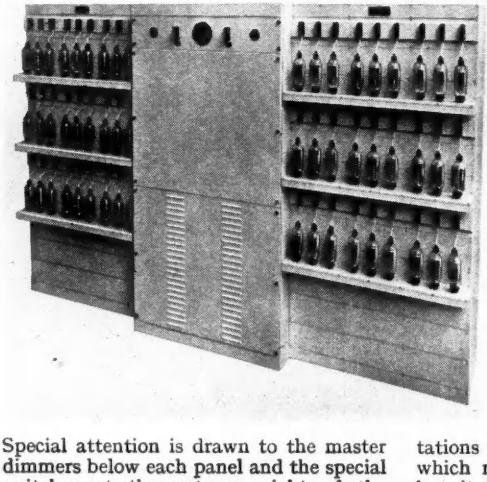
Master dimmers are provided whereby any circuits may be dimmed whilst any others are simultaneously brightened at the same or any speed, whether the circuits are on the same or different rows. The dimming and brightening are achieved by the operation of only two controls, and without disturbing any pre-



Group of twelve circuit control units forming part of a central panel: (a) Moulding, 6¼ in by 1 in, carrying miniature "dimmer"; (b) operating handle; (c) graduated scale; (d) two-way-and-off switch; (e) row master dimmer; (f) row master switch (two-way-and-off); (g) pilot lamp; (h) panel master switch

selection which may have been made on the duplicate panel. As the intensity of the lighting is controlled by varying the voltage instead of the current there is a considerable financial saving in the use of the board.

The various facilities available will be more readily grasped if reference is made to the illustrations of the control panel.



Valve bank (36-way) with space to increase up to 48 ways

Special attention is drawn to the master dimmers below each panel and the special switches at the extreme right of the boards for releasing individual horizontal rows of circuit controls from the grand cross master control for use on occasions when it is desired to change over some but not all circuits. A dead black-out switch at the top right of the board controls the whole of both panels simultaneously by a single operation.

Any lighting load between maximum and zero may be smoothly regulated by its circuit dimmer. A two-way-and-off circuit switch connects the individual circuit either to the main supply through the row master switch or feeds the circuit independently of the row master switch. The same switch also gives the operator the choice of placing the individual circuit under the control of its row master dimmer or not. Incidentally, the individual circuit control units are standardized and, being plugged in, are interchangeable in a few seconds.

As the row master controls functions electrically, individual circuits are dimmed or brightened proportionately and the individual dimmer handles do not move. Consequently it is always possible to return to any previous dimmer setting or intensities.

There are no technical limitations to the number of circuits or rows which may constitute a complete panel but it is considered that 144 ways are the maximum that an individual operator can cope with. If desired the control

panel can be arranged for flush or surface wall mounting instead of in the form of a desk. The control desk is operated on 230V d.c. provided by metal rectifiers on the valve bank. It is completely internally wired to numbered terminal blocks and apart from accessories such as signal lights, remote colour change switches, etc., only one wire per dimmer-way plus three feed wires are required. Testing is quite a simple matter.

The valve bank, which is designed to operate from a 200-250 V a.c. supply, may be situated up to 400ft from the control board. To handle 48 circuits of 2 kW each a bank measures 9ft wide by 2ft deep by 5ft 11in high. Sufficient space is provided to substitute 5 kW valves if desired. The layout is very simple and all components are easily accessible. There are no moving parts other than the main contactor and a time delay switch for use when starting up.

The load is balanced across phases at any stage of operation and should a valve fail the others are not overloaded and the board will still operate. Actually, valve replacement is a rare occurrence, and a minimum valve life equivalent to three years' operation can be expected.

Orders in hand for the new type of board include 144-way models for the National Theatre, Iceland, and the New Theatre, London, 36-way boards for Harrogate and Stockport and two installations for Blackpool.

The same manufacturers have also recently completed the installation of one of their "Strand" light consoles at the London Palladium, which also included the re-equipping of the stage. This form of control has been in existence for some years. With the aid of the "stops" and the keyboards it is possible to reproduce any lighting sequence desired, including changing the colour media in the front of some of the lanterns. In this instance the console controls 152 circuits. Another console controlling 221 circuits will be completed at the Drury Lane Theatre, London, early next year, and an order has recently been obtained to install one at the Stoll Theatre, Kingsway (160 ways).

South African Conditions

Serious Effects of the Import Ban

By R. CHILDS*

THE recent drastic embargoes on exports from this country to the Union of South Africa have come at a time when the electrical industry badly needed the Union business to maintain the high level of its exports and also when production planning for export had already been made more difficult because of licensing restrictions in India, which together with South Africa has, since the war, provided a large proportion of electrical export business.

To appreciate fully the trend in South Africa one has to review the post-war years of 1946, 1947 and 1948, when the South African electrical trade was buying madly from whatever country could offer the goods in a reasonable time. This was more noticeable probably in 1946 and 1947, but orders placed then for "anticipated deliveries" against "anticipated allocations" by overseas manufacturers were suddenly delivered in the latter half of 1948 when the easy money market had already gone. Dollars were freely given by the authorities as were other currencies, and importers were guilty in several instances of buying against an anticipated demand which had been mostly satisfied. This was particularly obvious in the radio and domestic appliance trade, where the post-war years produced so much unsaleable "trash" which is still in the electrical warehouses in South Africa, if it has been cleared out of bond where many such shipments lay.

Such wild spending was not only confined to the electrical trade but also to every field of interest in South Africa, wherever the speculators, in which the Union abounds, thought they could see quick and easy profits.

* Mr. Childs is Export Manager of Thorn Electrical Industries, Ltd., and has just returned from an extended visit to South Africa.

Trade, however, finds its own level in the world, providing the elementary principles of supply and demand can be followed; but in these days the intervention of governments seems to be considered vital to control, regulate or destroy international currencies. Thus, in South Africa, a crisis was suddenly produced—exchange evidently having disappeared overnight (according to Government statisticians). Therefore, following the now accepted practice of all government servants, controls must be enforced, as private enterprise does not know how to control its own affairs, this being the prerogative of Governments.

Many business circles in South Africa must have asked themselves whether the position was as drastic as they had been told. If it was, the complete ban on all imports from a set date must cause considerable chaos in South Africa's primary industries without which the Union would be even more a debtor country.

Effect on Importers

The effect of the ban was to drive the importers to indulge once again in lavish orders if manufacturers could get them on the water by the deadline date. Some (but very few) of the goods might have been essential to South Africa, but in the main, and especially in the consumer goods trades it gave manufacturers a wonderful opportunity to clear stock which many had expected to hold on to for many months.

In the electrical trade in South Africa, it was the opinion of influential observers that in most items the country had sufficient stocks to last for over a year and the trade had settled down before the ban to re-stocking orders only and intensive sales drives to clear their stocks. Unfortunately, the "beat the ban" shipments have worsened the general situation and with no organization available immediately in Pretoria to carry out the control, with every firm applying on principle for import licences, the task of making the restrictive control work smoothly is impossible.

This has led observers to take the view that the move was perhaps more political than essential: possibly not unconnected with the natural desire for a higher price for gold or a loan from the United States or (of less importance) from the sterling area. So much foreign capital has already been placed into South Africa in the form of local manufacturing plants, and the basic exporting industries in the Union are so strong, that one must wonder whether or not the Government's action was much too drastic, and it would not be surprising to find that the industries most badly hit by the controls are those most necessary for the future prosperity of the country.

"Essential Import" Quotas

Licences evidently have just begun to trickle through for "essential imports," but on such a low quota figure that all industries have been greatly perturbed about the future and whereas before the ban foreign firms were anxious to manufacture in the Union, there is a strong feeling to-day that conditions are too insecure to take the risk involved. The money intended for the Union has, therefore, begun to flow in a more northerly direction, and it would not surprise the writer to find that the restrictions in the Union have provided for the developing Rhodesias the much needed foreign capital for their essential schemes.

Union firms were not slow to see the opportunities offered and within a month of the ban, business executives were leaving the Union by every plane to investigate whether or not their money could be put to safer work up North.

That this is a temporary phase only is the general opinion in the Union, and it is to be hoped that South Africa will soon put her affairs in order to encourage a free flow of inward and outward trade by which South Africa has already become one of the world's fastest developed countries.

Radio-Telephony in Nyasaland

THE International Marine Radio Co., Ltd., has obtained an order from the Nyasaland Railways for the supply and installation of equipment to operate a medium high-frequency radio-telephone system over Lake Nyasa in Africa. The equipment will include eight shore stations, three of which will use newly developed 75-watt transmitters and pre-tuned receivers. The remainder, together with two lake steamers, will operate with the lower-powered transmitter-receivers now in current production by the company.

Commerce and Industry

Rubber Production and Consumption

Load Spreading Next Winter

THE Secretariat of the Rubber Study Group states that the production of natural rubber in the first six months of this year amounted to 700,000 long tons and consumption to 732,500 tons; stocks at 30th June were 680,000 tons (excluding Government stocks) which was 90,000 tons less than at 1st January. Synthetic rubber production totalled 235,000 tons and consumption 237,500 tons. Stocks at the end of the period amounted to 120,000 tons, a fall of 7,500 tons since 1st January.

Training Draughtsmen

In view of the continuing shortage of draughtsmen in the engineering industries, the Ministry of Labour and National Service has drawn attention to a successful scheme for the training of draughtsmen which has been built up by the English Electric Co. and its associates during the past fifteen years. Since July, 1945, when the scheme evolved into its present form, 266 students have passed successfully through the school. Emphasis is placed on "shop" experience and young men are drawn from the company's own apprentices or from those with practical experience with smaller firms in the industry. Young men over 21 years of age selected for entry to the school are given substantial remuneration during training; those below that age are paid wages according to a rate-for-age schedule.

Victoria Electricity Chairmanship

According to the *Evening News* a final decision on the appointment of a new chairman of the State Electricity Commission of Victoria, to succeed Mr. G. G. Jobbins has been deferred by the State Cabinet. Inquiries are still being made about two British applicants for the position.

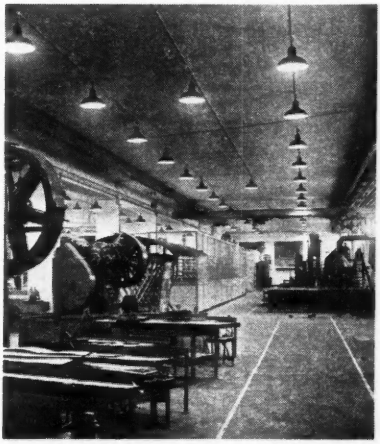
Winter Power Arrangements

Electricity power cuts in London factories, business houses and shops will be less severe this winter and there will be shorter "switch-off" periods as a result of a new plan worked out by the London and South-East Regional Board for Industry. There will be no compulsory load spreading in October. Next winter's cuts will be as follows:—November: 4 p.m. to 5.30 p.m., a 10 per cent cut. December and January: Between 8 a.m. and 10 a.m., 20 per cent cut; 10 a.m. and 12 noon, 10 per cent; 4 p.m. and 5.30 p.m., 20 per cent. February: 8 a.m. to 10 a.m., 20 per cent; 10 a.m. to 12 noon, 10 per cent.

A decision regarding evening hours in February and both morning and evening periods in March will be reached in January.

Danish Workshop Lighting

Correctly planned lighting, providing an excellent illumination level, is shown to advantage in the accompanying picture of a machine shop at the works of A/S Titan, Copenhagen. Here, 200 W tungsten filament lamps are housed in B.T.H. industrial dispersive reflectors, with the fittings so arranged as to give best possible overall visual conditions without glare.



[Lighting in a Danish workshop

Plastics Company's Progress

A history of the group of companies controlled by British Industrial Plastics, Ltd., has been published showing its growth from the formation of the British Cyanides Co., Ltd., in 1895, and the rapid development of its successor British Industrial Plastics, Ltd. The book is well produced, with a

foreword by Mr. K. M. Chance, chairman of the company, and contains many excellent photographs of the processes involved in the manufacture of the group's products. A special chapter deals with the group's contribution to the war effort.

Lighting for Footwear Displays

For many years before the war Crompton Parkinson, Ltd., planned the window lighting and supplied the material for over 150 of the branches of Lennards, Ltd., footwear specialists. New installations have now been completed in more than 120 of the company's shops, and the lighting consists of Crompton Parkinson fluorescent fittings with 80 W "warm-white" tubes completely concealed from onlookers. A typical example of the new window lighting is shown in the accompanying illustration.

Crompton fluorescent lighting of footwear display

International Scientific Film Congress

The Third International Scientific Film Congress will be held in Brussels from 30th September to 5th October next, when delegations from many countries will meet to discuss progress on various subjects of importance in relation to the international aspect of scientific films. Sub-committees will be presenting reports on such projects as the establishment of a standard method for cataloguing and recording information about scientific films, customs regulations and the international exchange of scientific films.

In conjunction with the Congress there will be a Scientific Film Festival. This will include four public sessions with films dealing with research education and scientific documentary. The fourth show will consist of general scientific films. In addition to the public shows, there will be four sessions intended for specialists. The fields covered will be research, education, industry and medicine.

The Scientific Film Association of Great Britain is considering the films to be submitted as the British entry in the Festival. Whilst the Association has knowledge of most of the major films, it would appreciate information regarding privately produced films which would be suitable for inclusion. Full details should be sent to 4, Great Russell Street, London, W.C.1.

Washing Machine Production

Simplified and increased production follows a complete reorganization of the arrangements for manufacturing the Bendix washing machine at the Kingsbury Road factory of Fisher & Ludlow, Ltd., who now hold a controlling interest in Bendix Home Appliances, Ltd. All but a few operations have now been transferred to one single-storey building where a flow system of production has been instituted.

All materials and ready-made components are inspected on arrival before going into stores, whence they are made up into sets and issued to the production lines. Separate spares and special components despatch sections are provided. Large pressings and sub-assemblies such as cradles, enter at the end of the building where they are assembled and are passed on to the bonderizing and painting plant, which, comprising dipping

End of main production line for Bendix washing machines

drying and baking plant served by conveyors, is now compactly arranged in one area.

Flow of the sub-assembly is sideways across the factory towards the main assembly line where the machines are gradually built up and receive comprehensive electrical and water tests at various stages. Production at present is steady but is restricted by the steel allocation. A large proportion of the company's output is absorbed by export orders

Shock from "Pre-fab"

A Plymouth Corporation housing tenant, Mr. E. R. Hyatt, of Belstone Avenue, Woodlands, Honicknowle, Plymouth, received an electric shock when, returning with his family from holiday, he put the key in the lock of the front door of his aluminium bungalow. Going to the back of the house he tried to push open a window, but found that he could not let go. He shouted to his wife and children to keep away and eventually fell off the window-sill.

Mr. Hyatt telephoned the electricity authority and men were sent to the house to cut off the electricity. After lunch the family left and when they returned a shock was felt when the key was pushed into the front-door lock. They left again and when Mrs. Hyatt returned next day she was alarmed to find hot water running from the cold water tap.

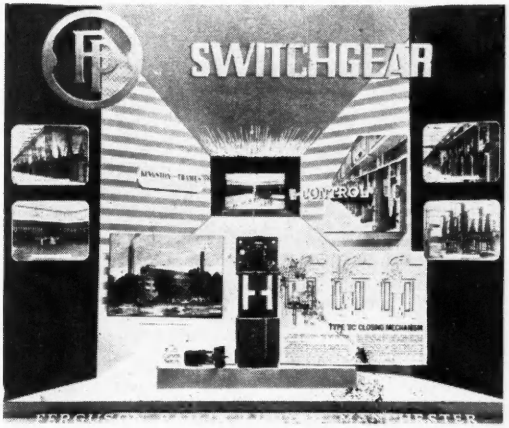
A Plymouth Corporation official said that the incident was considered to be an isolated one. Precautions were being taken to prevent a repetition. Mr. G. J. Hollyer, sub-area manager of the South-Western Electricity Board, said that an inspection was being made of all similar houses. Had the framework of Mr. Hyatt's house been properly earthed the fuse would have blown, but an earth clip had worked slightly loose.

American Capital in Japan

According to the *Sunday Times* Tokyo representative, the International Standard Electric, General Electric and Western Electric organizations of America are discussing investment in and partnership with the Japan Electric Company, the Tokyo-Shibaura Electric Company and the Mitsubishi Electrical Machinery Company respectively. Standard Electric wants a 50 per cent capital holding in the Japan Electric Company and patent fees of from 2 to 5 per cent, and the Japan Electric Company wants interchange of material at cost price, joint use of all patents, the right to send research workers to the United States, and American investment in production materials. This particular merger would have profound repercussions on the Japanese radio, telephone and teletype market, and, it is already estimated, it would reduce by 80 per cent the existing scale of equipment required for the production of radio valves.

Switchgear Window Display

The latest window display at the Associated Electrical Industries premises at Crown House, Aldwych, London, W.C.2, is an effective arrangement of photographs of Ferguson, Pailin switchgear, which we show in the accompanying illustration.



Ferguson, Pailin display at Crown House, Aldwych

Textile Machinery Exhibition

The Textile Machinery and Accessories, Yarns and Fabrics Exhibition will be held at Belle Vue, Manchester, from 12th to 22nd October next. Among the electrical and allied companies who are exhibiting are the following:—Bakelite, Ltd.; Brook Motors, Ltd.; Carrier Engineering Co., Ltd.; Crompton Parkinson, Ltd.; Drayton Regulator & Instrument Co., Ltd.; Electrical Productions (Leeds), Ltd.; Erskine, Heap & Co., Ltd.; Ferranti, Ltd.; General Electric Co., Ltd.; Alfred Herbert, Ltd.; Hoffman Manufacturing Co., Ltd.; Hoover, Ltd.; Mather & Platt, Ltd.; Metropolitan-Vickers Electrical Co., Ltd.; Morgan Crucible Co., Ltd.; Newman Industries,

Ltd.; Renold & Coventry Chain Co., Ltd.; Silentbloc, Ltd.; Skefko Ball-Bearing Co., Ltd.; Smith's Industrial Instruments, Ltd.; J. Stone & Co., Ltd.; Tecalemit, Ltd.; and Tufnol, Ltd. The North-Western Electricity Board will also be exhibiting.

Royal Welsh Show

The Royal Welsh Agricultural Show was held at Singleton Park, Swansea, from 10th-13th August. The joint E.D.A./South Wales Electricity Board exhibit occupied a prominent site on the main avenue leading to the ring. It was held in four pavilions and included apparatus for the horticultural and poultry industries and for the commercial caterer as well as representative domestic appliances.

The E.D.A.—South Wales Electricity Board display at the Royal Welsh Show, Swansea

The natural undulating tendency of the showground might have presented some considerable difficulty in staging an exhibit but this disadvantage was made use of by the Electrical Exhibit Committee to stage a striking display. The visitors leaving the usually rough showground roadways found a raised and paved terrace of electricity stands with flower beds and fountain, which was a great contrast to the surroundings. Exhibits which attracted special attention included a chilled water milk cooler, a working hammer mill, a steam raiser and a hedge trimmer. The total number of visitors to the show was 102,000.

The chairman and members of the Electrical Exhibit Committee held an informal luncheon at the electricity stand on 11th August which was attended by members and chief officials of the South Wales Electricity Board and their wives. Mr. L. Howles, the chairman of the Board, presided.

Defective Installation

An inquiry was held recently at Cowdenbeath into the death of a haulage contractor who received a fatal electric shock while using a portable electric drill for reconstructing a motor lorry. Mr. J. G. Curtis, sub-area engineer, S.E. Scotland Electricity Board, said he found at the premises a certain amount of "unofficial" installation which his department knew nothing about. Cables had been led from the house to the garage and the workshop. He found no fault in the plug used for the drill, but definite evidence of a fault in an overhead lighting fitting, with a considerable amount of arcing. The live conductor was in contact with the lead cable covering which was thus made alive. He also examined the fuse-box in the house and found that the wire used in one fuse was capable of carrying 100 A and in another 60 A.

Aluminium Price Increase

The Ministry of Supply announces that from Monday last the price of virgin aluminium in ingot form has been increased from £90 to £93 per long ton, delivered into consumers' works, with the addition of £2 10s per ton for metal in notch bar form. The new price will apply to metal of a purity of 99 per cent to 99.5 per cent inclusive, and the existing premiums for higher purities will be payable in addition.

Trade Announcements

The head office of **British Electrical Repairs, Ltd.,** has been transferred to Empire House, 10, Charlotte Street, Manchester, 1 (telephone Central 1378).

Robshaw Brothers, Ltd., 10, Exeter Road, Bournemouth, announce that they have appointed Mr. W. H. Boyce as an electrical representative operating from their Bournemouth depot.

Smith's Electric Vehicles, Ltd., announce that T. H. Lewis, Ltd., of Watford, have agreed to undertake the distribution and service of N.C.B. electric vehicles in London and the South Eastern Counties.

Further examples of dealer sales aids, produced by the Advertising Division of the

Gramophone Co., Ltd., include two posters printed in full colour illustrating several examples from the wide range of H.M.V. household appliances. They are made available to H.M.V. dealers through their normal wholesale distributors.

As from 1st September the counties of Derbyshire and Nottinghamshire will be controlled from the Birmingham office of **Simpson, Baker & Co., Ltd.,** at 13-15, Anderton Street, Birmingham, 1. Mr. W. Milward has been appointed as representative for these two counties.

Small Electric Motors, Ltd., Beckenham, Kent, announces that as from 1st August the prices of all its industrial motors have been reduced by 10 per cent.

Change of Name

Durham Cables, Ltd., has changed its title to Decel Investments, Ltd.

Tower Clock for Kowloon

Four 12 ft cast-iron skeleton dials, with hands, motion work and heavy duty synchronous movement were recently sent from Gent & Co's works at Leicester to London docks, on the first stage of their journey to China aboard the *S.S. Canton*. This clock will be installed in the new telephone exchange buildings at Kowloon, where the railway station was also equipped with a Gent four dial tower clock some years before the war.

Catalogues and Lists

Tudor Accumulator Co., Ltd., 50, Grosvenor Gardens, London, S.W.1.—Technical brochure on batteries for emergency lighting and switch operation in power stations and catalogue of cells up to 800 Ah capacity.

Morgan Crucible Co., Ltd., Battersea Works, Battersea Church Road, London, S.W.11.—Leaflet on "Morganite" brush bedding stones.

Alliance Wholesale, Ltd., 62-63, Great Russell Street, London, W.C.1.—Priced catalogue of steel conduit, conduit fittings, accessories and tools, ironclad switch units, sockets and switched sockets.

Lea Recorder Co., Ltd., Recorder House, Cornbrook Park Road, Manchester, 15.—Technical brochure (CBM20) on methods and equipment used for the continuous measurement of coal and other granular materials in bulk.

Heala (Electro Medical), Ltd., Cherry Street, Woking, Surrey.—Priced leaflet on infra-red medical lungs and 18-page brochure on their use.

Metway Electrical Industries, Ltd., King Street, Brighton, 1.—Priced leaflet illustrating general purpose floodlights.

R. & A. G. Crossland, Ltd., Cartbridge Lane, Walsall, Staffs.—Catalogue of commercial and industrial lighting fittings.

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of 10th August:—

MEM. No. 669,913. Class 7. Machines included in Class 7, machine tools, electric motors (other than electric motors for land vehicles) and electricity generators, and parts of all such goods included in Class 7. No. 669,915. Class 11. Apparatus for lighting, heating, cooking, refrigerating, drying and ventilating, and parts thereof included in Class 11.—Midland Electric Manufacturing Co., Ltd., Reddings Lane, Tyseley, Birmingham, 11.

WELCOBEL. No. 671,339. Class 7. Electric motors (not for vehicles) and electric generators, and parts of all such goods included in Class 7.—Wespelaar Electro-Constructions, Wespelaar-lez-Louvain, Belgium. Address for service, c/o Marks & Clerk, 57 and 58, Lincoln's Inn Fields, London, W.C.2.

MERLEX. No. 662,491. Class 9. Electrical apparatus and instruments included in Class 9, scientific apparatus and wireless apparatus.—Truvox Engineering Co., Ltd., Truvox House, Exhibition Grounds, Wembley, Middx.

No. 669,096 (design). Class 9. Radio receiving sets, radiogramophone combinations and television apparatus and parts of all such goods included in Class 9; and electric batteries, condensers, capacitors, and combined slide film projection and sound-reproducing apparatus.—The Magnavox Co., Fort Wayne, Indiana, U.S.A. Address for service, c/o A. A. Thornton & Co., 24-27, High Holborn, W.C.1.

BLUE PETER (design). No. 674,125. Class 9. Radio receiving sets (complete).—Pilot Radio, Ltd., 31-37, Park Royal Road, N.W.10.

TRUMAX. No. 674,569. Class 9. Electrically operated measuring apparatus, recording meters, controlling apparatus included in Class 9 for heating installations, checking (supervision) apparatus, indicating apparatus for inspectional control, coin-freed apparatus and calculating machines.—Landis & Gyr, Ltd., Elgee Works, Victoria Road, North Acton, London, W.3.

BIMFC. No. 676,412. Class 9. Electrical apparatus for determining the positions of electric cables and of faults therein, and parts of such apparatus included in Class 9.—British Insulated Callender's Cables, Ltd., Norfolk House, Norfolk Street, London, W.C.2.

Birmingham Golf Competition

A FURTHER golf competition has been arranged by the Birmingham Electric Club for 12th September next at Edgbaston Golf Club. The competition is limited to members only and will be followed by a buffet supper. Entrance forms should be returned to Mr. G. R. Stone, assistant hon. social secretary, 362, Heath Road South, Birmingham, 31, by 29th August.

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

A Meter Man's Error

AS must have happened to many of your readers and will, no doubt, happen to others, I received recently a notice from the Electricity Board that a representative would come to my house within 48 hours to replace the existing watt-hour meter by a new type of instrument. In due course an electrician arrived, did the job and went his way.

A few days before this letter was written, a maid received a severe shock whilst dusting an electric fire, which was plugged into a wall socket that was switched off. She had apparently touched the heater wire with her thumb whilst her hand was on the metal body of the fire.

As I knew that all switches were in the phase leads, there was only one possible conclusion: the Board's electrician must have reversed the connections of the "tails" between the meter and the distributor panel for the power circuits.

Tests and investigations showed that this had, in fact, taken place. It was found also that a similar reversal had been made in the case of the lighting circuits, which have their own "splitter." Every switch in the house was now breaking the neutral and not the phase lead. The chokes of 40 W fluorescent lamps were now also in the neutral "leg."

I need not emphasize the dangerous conditions produced by this almost incredible lack of skill or care on the part of a man, who had probably dealt with many other houses. In my own house it was fortunate that the victim of the shock which first showed that something was amiss had only one hand on the electric fire. If she had touched the heater wire with her right hand whilst her left was grasping the frame, the consequences might have been serious.

I should like to place on record that my telephoned report to the local office of the Board produced immediate effective action. Within half an hour a senior engineer arrived, confirmed my findings, and put the connections right. He also undertook to see that all the houses which had been dealt with by the employee in question should be visited and their meter connections checked.

It is possible that the same kind of thing may have happened in other homes and I suggest that, as a measure of safety, any reader whose meter has recently been changed, or any in whose home such a change is made in the future, may be well advised to test his installation without delay.

R. W. HALLOWS, M.A. (Cantab), *Berkhamsted.* M.I.E.E.

Coal Conference

THE need for rational allocation of coal is the theme of a conference to take place at Buxton (8th and 9th September, Palace Hotel) at which some twenty papers are to be read. Following a civic welcome there will be a discussion on the training of combustion engineers and a review of available facilities for the instruction of boiler attendants and firemen. The afternoon session will be concerned with technical advisory services relative to combustion engineering equipment and the form of liaison needed with the makers.

The whole of the second day will be devoted to the need for and economics of the rational allocation of coal. The Water Tube Boilermakers' Association will state the case from the boiler designers' point of view and Mr. A. Alan Taylor will present a paper on coal for the electricity supply industry. The conference will end with a ball. Particulars are obtainable from the Combustion Engineering Association, 24, Tottenham Court Road, London, W.1; attendance is not restricted to members.

Electronics Symposium

A THREE-DAY electronics symposium has been arranged by the Scientific Instrument Manufacturers' Association to take place in London (2nd to 4th November) at which a series of papers are to be presented on instrumentation in atomic research, amplifiers (electronic and magnetic), some recent measuring methods, an industrial servo-mechanism, and co-operative research. There will be a dispay of instruments during the symposium. Tickets are obtainable from the Association at 17, Princes Gate, London, S.W.7. Entrance to the exhibition will be by trade card.

I.E.E. Centre Chairmen

BRIEF BIOGRAPHIES

THE names of the chairmen of the local Centres and Sections of the Institution of Electrical Engineers were announced in our issue of 8th July, together with biographical notes of **Prof. E. B. Moullin**, M.A., Sc.D., the President of the Institution for the 1949-50 session. We now give below details of the careers of five of the Centre chairmen, and intend to deal with the remainder of the Centres and the Sections in later issues.

Mr. T. E. Daniel, M.Eng. (North-Eastern Centre) is deputy chairman of the North Eastern Electricity Board. He received his education at Wallasey Grammar School and at Liverpool University, and served an apprenticeship with Fawcett, Preston & Co., Liverpool. He was a trainee with the Northmet Power Co., in 1923-24, after which he joined the Battersea Borough Council as technical assistant, remaining there until 1932, when he took up the position of deputy borough electrical engineer at Ashton - under - Lyne, where, in the following year, he became borough electrical engineer. In 1937 he went to Darlington as borough electrical engineer, and upon the formation of the North Eastern Electricity Board last year he was appointed deputy chairman of the Board. Mr. Daniel is an associate member of the Institution of Mechanical Engineers.

Mr. T. E. Daniel

Mr. J. R. Rylands

Mr. J. W. Donovan

Mr. J. R. Rylands (North Midland Centre) was educated at the Central High School, the Central Technical College and the University of Leeds, and served an apprenticeship with Henry Berry & Co., Ltd., of Hunslet, Leeds. During the 1914-18 war he served with the Middlesex Regiment in France, and in 1921 he graduated B.Sc. with first class honours in mechanical engineering at Leeds University, and became M.Sc. in 1926. He went to the Gold Coast Colony, West Africa, in 1921, as assistant electrical engineer in the Abosso Mine of Tarquah & Abosso Consolidation, Ltd., with whom later he was for a short time chief engineer. In 1924 he returned to this country to take up the position of assistant engineer to E. Green & Son, Ltd., fuel economizer manufacturers, Wakefield, with whom he became chief engineer in 1943, and last year he was elected a director of the company. He has travelled extensively in Europe, Australia and South America for his company. Mr. Rylands is a member of the Institution of Mechanical Engineers and a founder member of the Institute of Fuel, of which he became a Fellow in 1939. He is the author of several papers on fuel economizers, air heaters, deposit and corrosion problems, and in 1943, jointly with Mr. J. R. Jenkinson, was awarded the John Hopkinson premium by the I.E.E. for a paper on "Bonded Deposits on Economizer Heating Surfaces."

Mr. J. W. Donovan (South Midland Centre) is a director of the Donovan Electrical Co., Ltd., Birmingham. His education was received at King Edward's School, Birmingham, and at the University of Birmingham, where he obtained a first class honours degree in electrical engineering. He entered the drawing office of George Ellison, Ltd., in 1925, and in the following year went to the United States where, for a short period he was in the switchgear division and the machine shop of the American General Electric Co. From there he went to Cutler Hammer, Inc., with whom he obtained experience in motor control apparatus. Mr. Donovan returned to this country in 1930 to join the Donovan Electrical Co., Ltd. He was president of the Birmingham Electric Club in 1941-42.

Mr. R. H. Coates, B.Sc. (Eng.), A.M.Inst. C.E., A.M.I.Mech.E. (Southern Centre) is controller, Southern Division, British Electricity Authority. He received his general education in London and Southsea and his technical education at the Regent Street Polytechnic (gold medallist) and took an

honours degree in engineering at the London University. He served an apprenticeship with the Metropolitan-Vickers Electrical Co., Ltd., and after short periods with Kennedy & Donkin and the Metropolitan-Vickers Co. he was for three and a half years on the operation staff of the Central Electricity Board, first in the South-East England Area office and then at the head

Mr. R. H. Coates

Dr. C. Dannatt

office. In 1937 he went to Sheffield as technical assistant, becoming deputy general manager and engineer in 1943. He was appointed engineer and manager of the Portsmouth electricity undertaking in 1945 and in April, 1948, took up his present post with the B.E.A. Mr. Coates was the joint author in 1945 of a paper on "Operation of Large Turbo-Alternators to Reduce Rotor Winding Deformation," for which the Ayrton premium was awarded by the I.E.E. He is a member of the British Association of Commercial and Industrial Education and a governor of Portsmouth Technical College.

Mr. C. Dannatt, O.B.E., D.Sc. (North-Western Centre) is a director and chief electrical engineer of the Metropolitan-Vickers Electrical Co., Ltd. He received his education at Armstrong College, University of Durham, and his training as a college apprentice with the Metropolitan-Vickers Co. He served in the York and Lancaster Regiment in the 1914-18 war, attaining the rank of captain and being awarded the M.C. In 1921 he was appointed research engineer with the Metropolitan-Vickers Electrical Co. and in 1941 became Professor of Electrical Engineering at Birmingham University, but at the request of the Admiralty he continued part-time activities with the Metropolitan-Vickers Co. In the 1943 New Year Honours he was awarded the O.B.E. for contributions to naval gunnery. He returned to the Metropolitan-Vickers Co. in 1944 as assistant to the chief electrical engineer and in the following year he was appointed deputy chief electrical engineer, becoming chief electrical engineer and a director of the company in 1947.

Public Lighting

Llandudno Conference Programme

THIS year marks the 25th anniversary of the Association of Public Lighting Engineers, and a record attendance is expected at the Association's annual conference, which is being held at Llandudno from 12th to 16th September.

Proceedings commence on Monday, 12th September, with the annual general meeting, after which the conference will be officially opened by Councillor A. MacFarlane, chairman of the Llandudno U.D.C. Mr. A. S. Tapsfield, of the City Engineer's Department, Corporation of the City of London, will then be inducted as president and will, with Councillor MacFarlane, lead the official inspection of the display of lighting equipment and accessories which is being arranged on the Promenade. In the evening there will be a civic reception.

On Tuesday, Mr. Tapsfield will deliver his presidential address and subsequently Mr. Norman Axford, B.Sc.(Eng.), A.M.I.E.E. (Northmet Sub-Area, Eastern Electricity Board) will present a paper on "The Economics of Street Lighting." The afternoon session will be devoted to a paper, "Code or Specification," by Mr. F. C. Smith, M.Inst. Gas E., F.I.E.S.

Wednesday's business begins with a session on "Recent Developments in Electric Street Lighting Equipment." Details have been provided by manufacturers and will be presented by Mr. J. A. Prowse (E.D.A.). After the annual luncheon, at the Café Royal, there will be a similar session on gas street lighting equipment.

"Roads Abroad and Their Lighting" is the title of a paper to be read on Thursday morning by Mr. J. M. Waldram, president of the Illuminating Engineering Society. In the afternoon, Mr. W. H. Welch (Eastern Gas Board) will deal with "Planning of Street Lighting for a Proposed New Town." The president and Mrs. Tapsfield will hold a reception in the evening at the Pier Pavilion (where all the meetings are being held), followed by dancing.

A paper on "Public Lighting and Aesthetics" is to be presented on Friday morning by Monsieur L. Gaymard, chief lighting engineer, Paris. Then there is to be an "Open Forum." A coach tour through North Wales is being arranged for the afternoon. Special arrangements are being made for a steamboat or coach tour for the ladies attending the conference.

RECENT INTRODUCTIONS

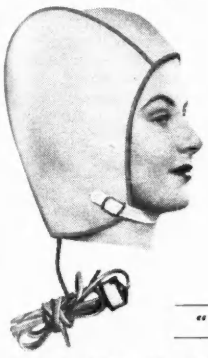
Notes On New Electrical and Allied Products

Silicone Rubber Insulated Cables

IT is announced that the maximum working temperature of silicone rubber insulated cables and wires made by BRITISH INSULATED CALLENDER'S CABLES, LTD., has been raised to 150 deg C. These cables and wires may also be used at temperatures well below freezing point. Typical applications include their use as thermocouple leads, as instrument leads and connections in boiler houses, for wiring furnaces, ovens, engine rooms, etc. The company manufactures cables and flexibles with this type of insulation having conductor sizes to B.S. 7 and also radio connecting wires. Insulating sleevings in a wide range of sizes and colours can be supplied.

Hair Dryer

As an improvement on hot towels CALLINAN GILES & CO., LTD., 9, Newman Street, London, W.1., have developed the "Caltona" "hair conditioning" unit. Similar to a bathing cap in appearance, the unit is placed on the hair (after it has been shampooed and treated with a special cream) for a quarter of an hour, after which the hair is rinsed in plain warm water and set.



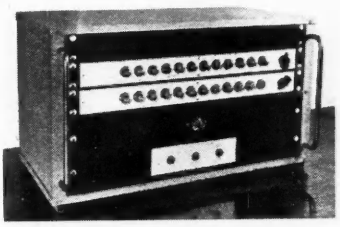
"Caltona" hair dryer

The heater of the unit has a loading of 50 W and is thermostatically controlled to three selected heats. The mains model sells at 7gns, a low-voltage model being also available for 10gns complete with transformer.

Electronic Batching Counter

A valve-operated instrument for counting and batching small articles at high speed has just been placed on the market by SARGROVE ELECTRONICS, LTD., Effingham, Surrey.

It will count and batch in quantities predetermined by the setting of two switches, and provide visual indication of units, tens, dozens and grosses or any other combination in this range, and will automatically repeat the cycle on completion of each batch. The largest batch for which the standard model can be used is one gross, but the addition of one further stage will enable the instrument to operate up to 12 gross.



Sargrove electronic batching counter

Cycle Lamp

In designing a new front lamp for bicycles the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, has had in view the avoidance of several difficulties familiar to those who cycle in all weathers. The new de luxe lamp is constructed for easy access to bulb and battery, the body being in two separate halves which fit together with a generous overlap to form a weatherproof joint. The screw-down switch is smooth in action, and a positive "off" position is provided by means of a stop on the case which prevents the battery

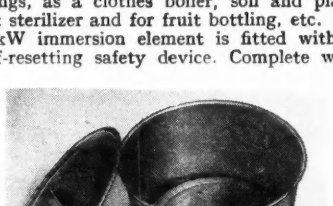
G.E.C. cycle lamp

contact rising above a fixed level when the switch is unscrewed.

A carrying handle is held by a clip when the lamp is on the cycle bracket so that it does not rattle. A moisture vent in the window and a shrouded fixing socket are other details in which serviceability in bad weather have been studied. A modified pattern for overseas use is in course of preparation.

Immersion-heater Boiler

The 4 gal "Handy-Boiler" made by F. J. TOMLINSON, LTD., Hall Carr Mill, Rawtenstall, is of heavily galvanized iron construction and can be used, among other things, as a clothes boiler, soil and plant pot sterilizer and for fruit bottling, etc. Its 1 kW immersion element is fitted with a self-resetting safety device. Complete with



The "Handy-Boiler"

connector and 6ft of t.r.s. flexible cable, the price is 49s 6d.

Extruded Plastics

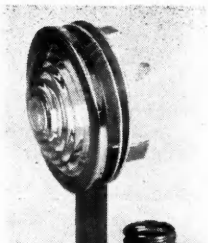
Rigid plastic extrusions, in the form of tubing, electrical conduits, kicking boards, etc., have just been placed on the market by De La Rue Extrusions, Ltd., 84, Regent Street, London, W.1. They are of a phenolic thermosetting classification, being available in black, brown, green, and red, plain or mottled, with a durable high gloss finish. Normal metal working tools may be used for the fabrication of these plastic extrusions.

They may be sawn, filed, bored or ground without danger of chipping, but specially hard-tipped tools are advised for repetition work. Although they cannot be bent after manufacture, most sections may be curved during the actual extrusion process. Special sections can be designed to suit individual requirements.

Signal Lamps

A signal lamp assembly which is available from A. F. BULGIN & Co., LTD., By-Pass Road, Barking, Essex, accepts 15 W mains voltage lamps fitted with s.e.s. caps. It may readily be fitted to panels up to 0.5in thick, only a single hole (notch-rim or not) being required. The plastic lenses can be supplied in a variety of colours and

Bulgin signal lamp assembly

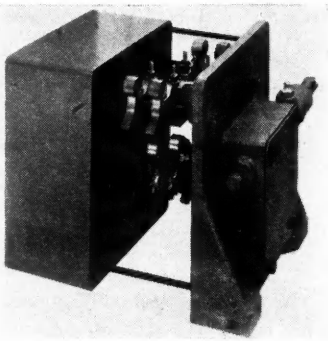


the associated metal rims are available in any finish to suit individual requirements.

Geared Limit Switch

The "Dupar" type SWS limit switch has been developed by DEWHURST & PARTNER, LTD., Inverness Works, Hounslow, from a range of floor selector units for lifts. It is adaptable to a very wide range of applications which involve the stopping at a predetermined position of equipment such as skip hoists, cranes, machine tools, planing machines, sliding or rolling shutters and doors.

The unit, which is of extremely robust construction, is designed for shunt circuit switching in conjunction with contactor gear and incorporates a micro-adjustment feature for accurate setting of the limit position. The switch-striker gear is actuated through a heavy duty worm reduction gear having a ratio of 36:1. From this is taken a plain shaft extension, by means of which



"Dupar" type SWS limit switch

the drive is transmitted from the drive motor either direct or through gearing to meet the requirements of the particular application.

Electrical Equipment Production

MORE GENERATING PLANT

GENERATING plant production reached a high level in May, the latest month for which figures are published. A table in the July *Monthly Digest of Statistics*, published by the Central Office of Information, gives the total deliveries of steam turbines the May figure was 59,100 kW, which included 42,100 kW for export. The latest records of deliveries of smaller steam turbines (under 10,000 kW) are for the first quarter of the year, when the monthly average was 28,900 kW (export 19,900 kW),

Class	Volume or value	Latest monthly figure	For export	Monthly average for whole of 1948	For export
Steam turbo-alternators over 10 MW	Deliveries in MW	353.5 (May)	117.5	112.0	89.0
Steam turbo-alternators under 10 MW ...	,, ,,	28.9 (av. Jan. Mar.)	19.9	24.8	18.1
Hydraulic turbines ...	,, Thous. b.h.p.	59.1 (May)	42.1	6.4	4.2
A.C. motors and other rotating machines 1-250 h.p., kVA or kW ...	,, £(000)	1,870 (April)	459	1,715	311
Motors, f.h.p.	,, ,,	509 ,,	121	617	109
Elec. control gear ...	,, ,,	1,077 ,,	222	994	*
Water tube boilers ...	,, ,,	1,974 ,,	632	1,944	722
Elec. industrial furnaces	,, ,,	122 (May)	24	*	*
Battery driven vehicles...	Production (Number)	267 (June)	—	441	8
Refrigerators, domestic...	Deliveries £(000)	749 (May)	426	450	235
,, commercial	,, ,,	831 ,,	130	576	96
,, industrial	,, ,,	256 ,,	95	161	76
Radio sets, domestic ...	Production (Thous.)	105 ,,	32	13.6	27
Television sets	,, ,,	11.3 ,,	—	7.5	—
Accumulators	Deliveries £(000)	1,180 (April)	428	1,250	357
Dry cells	Produc. mill. unit cells	63.83 (Feb.)	7.05	72.2	5.3
Elec. lamp bulbs (complete)	Deliveries £(000)	929 (Mar.)	172	981	144
Insulated wire & cable...	,, ,,	6,109 (av. Jan. Mar.)	1,985	5,824	2,048
Elec. fires	,, Thousands	20.4 (June)	2.7	28.1	*
Elec. irons	,, ,,	125.6 (av. Jan. Mar.)	31.1	141.3	38.2
Vacuum cleaners ...	,, ,,	48.6 ,,	21.6	54.3	14.8
Kettles	,, ,,	80.8 ,,	6.7	40.4	6.7
Washing machines ...	,, ,,	20.8 (April)	6.7	12.0	4.2
Elec. clocks	,, ,,	41	*	60	*

* Not separately distinguished.

turbo-alternators of 10,000 kW and over in May as 353,500 kW, of which 117,500 kW was for export. In April deliveries aggregated 322,500 kW (export 130,000 kW). Before that the highest figure in the preceding twelve months was 198,400 kW in September, 1948. For hydraulic compared with just over 16,000 kW in the preceding two quarters.

Details of the latest figures for various classes of electrical equipment, together with the 1948 monthly averages for comparison, are given in the accompanying table.

Precision Electrometer

A TRIPLE-range portable electrometer suitable for the precision measurement of currents of the order of 10^{-11} to 10^{-14} A is described at some length by N. T. Seaton of the University of California, United States, in the July issue of the *Review of Scientific Instruments*, a publication which is produced by the American Institute of Physics.

Current is measured in terms of the automatically registered time interval required to charge a condenser up to a certain voltage. The use of negative feedback and the operating conditions for the input FP-54 Pliotron, a special relay, allow current to be determined to within 0.1 per cent. Radio type dry batteries, which operate the instrument completely, except for a timer, are contained within the timer and last for at least 250 hours.

This electrometer, although more expensive to construct than most, has the advantage of accuracy and convenience of operation. The simultaneous measurement of two currents can be accomplished by means of an extension of the method, with the result that, even though they may both arise from a widely fluctuating source, an accurate value of their relative intensities can be obtained.

FINANCIAL SECTION

Company News
Stock Exchange Activities

Reports and Dividends

Clyde Valley Electrical Power Co.—The final act in the history of the company has now been performed by the stockholders' representative, Mr. James Paterson, on the completion of his duties. Accompanying the statement are the accounts for the last three months of the company's operations, from 1st January to 31st March, 1948. Dividends for the period at the same rates as for the previous year were paid towards the end of last year, ordinary shareholders receiving 2 per cent actual. The net revenue for the three months amounted to £341,705 and investment income to £44,021, making a total of £385,726. In addition £46,133 was available from provisions no longer required and with £475,269 brought in, less £615 interest payable, the sum available for distribution was £906,513. Dividends absorbed £44,284, and the balance of net revenue for the quarter is subject to a transfer to contingency fund for depreciation.

The Globe Telegraph & Trust Co., Ltd.—In the course of his speech at the annual meeting held on 12th August, Sir Edward Wilshaw (chairman), said that the cost of investments was £5,578,608, which included their holding of £4,252,668 stock in Cable & Wireless (Holding), Ltd., which represented 38 per cent of their total invested funds and produced 61 per cent of their total gross investment income for the year under review. What the future of this stock might be he was unable to say until a scheme of arrangement had been submitted to that company's stockholders.

Whitehall Electric Investments, Ltd.—In the course of his speech at the annual meeting held on 10th August, the chairman said that the nationalization last year of the West of England company had had the result that gilt-edged investments and net floating assets amounted to £2,200,000, and since the directors considered that favourable opportunities for the acquisition of other electricity undertakings did not exist, they proposed that part of the capital of the company should be repaid.

At an extra-ordinary meeting which followed the annual meeting resolutions were carried for the reduction of the capital of the company. The scheme of arrangement put forward for the partial repayment of capital provided for the repayment of 25 per cent of the prefence stock at 25s per £1 stock, and 25 per cent of the ordinary stock at its nominal value. These payments will absorb £1,640,625, and will leave the issued capital of the company at £4,609,373 in £967,500 six per cent preference stock and £3,671,875 ordinary stock.

The Palestine Electric Corporation, Ltd., reports a net profit for 1948 of £97,511 (Israeli), as compared £P142,486 for the previous year. It is proposed to pay a dividend of 5 per cent, tax free, on the ordinary and "A" ordinary shares for the year (against nil). For 1946 both classes of ordinary received 7 per cent, tax free. Application has been made to the Capital Issues Committee for consent to the capitalization of £Israeli 289,604, part of the share premium account, to be distributed as a bonus issue to ordinary and "A" ordinary shareholders in the proportion of one ordinary share for each six ordinary and/or "A" ordinary shares held.

George Cohen, Sons, & Co., Ltd., in a preliminary statement, report a profit (including dividends from subsidiary companies) for the year ended 31st March last, before providing for taxation, of £455,941, and a net profit, after taxation, of £209,771. These figures compare with the relative profits for the previous year, before taxation, of £730,113, and net profit, after taxation, of £333,917. It is proposed to pay a final dividend on the ordinary stock of 12 per cent, less tax, again making 20 per cent for the year. The combined profits of the group for the year, excluding the amount applicable to minority interests, were £545,590, before taxation, and £213,638 after taxation, which compare with £892,092 and £395,920 respectively for the preceding year.

Falk, Stadelmann & Co., Ltd., have declared an unchanged interim dividend of 10 per cent.

New Companies

Luminaire, Ltd.—Registered 6th August. Capital £1,000. Manufacturing electrical engineers, etc. Subscribers: A. E. Starbuck and E. G. Baxter. Regd. office: Imperial House, Dominion Street, E.C.2.

Nicholl Bros. (Radio), Ltd.—Registered in Belfast 28th July. Capital £10,000.

Electrical engineers and contractors and general installation contractors, lighting specialists and contractors, wireless engineers, etc. Directors: N. Nicholl and N. Rainey. Regd. office: 11-13, Wellington Street, Ballymena.

Clarion Mechanical and Electrical Products, Ltd.—Registered 5th August. Capital £12,000. Electricians, mechanical engineers, etc. Directors: P. Kennedy, B. Wolfe, N. Moore and L. H. Watson. Solrs.: J. H. Hortin & Nash, 161, Edgware Road, W.2.

Brunlec Appliances, Ltd.—Registered 5th August. Capital £1,000. Manufacturers of and dealers in washing boilers and other domestic electrical appliances and fittings, etc. Directors: W. Pilkington, R. Pilkington and T. Thornton. Reg. office: 8, Ormerod Street, Burnley.

Denham's (Folkestone), Ltd.—Registered 6th August. Capital £1,000. Manufacturers and repairers of and dealers in electrical plant, machinery, fittings and accessories, wireless and television sets, etc. Subscribers: D. J. Denham and J. Harrod. Reg. office: 1, Denmark Street, Folkestone.

Kinsey's Radio Electric, Ltd.—Registered 8th August. Capital £2,000. Manufacturers and repairers of and dealers in wireless goods, etc. Directors: W. B. Kinsey and Mrs. Mary Kinsey, and D. R. Bannister. Reg. office: 521, Rochdale Road, Collyhurst, Manchester.

O'Regan Bros. (Electrical), Ltd.—Registered in Dublin 4th August. Capital £10,000. Electricians, mechanical engineers, armature winders, etc. Directors: D. O'Regan, C. O'Regan, H. M. O'Regan and A. O'Regan.

Gratte Samuels & Co., Ltd.—Registered 9th August. Capital £300. Manufacturers of and dealers in electrical and mechanical apparatus and accessories, radio sets and valves, etc. Directors: D. C. L. Gratte, A. M. B. Gratte, H. Wiener and D. Samuels. Regd. office: 13, Red Lion Square, W.C.1.

H. Morgenstern (Electrical), Ltd.—Registered 2nd July. Capital £1,000. Merchants, exporters and importers of and dealers in wireless, gramophone, television and electrical goods, etc. Directors: H. Morgenstern and Mrs. Mollie Morgenstern. Regd. office: 9, The Exchange, Muswell Hill, N.10.

Mulvary, Ltd.—Registered 26th July. Capital £1,500. Manufacturers and repairers of, and dealers in lighting apparatus, electrical plant, and accessories, signs wireless and television sets, etc. Directors: J. Blacker and H. Muller. Regd. office: 131, Stamford Street, Stalybridge.

N. France, Ltd.—Registered 26th July. Capital £5,000. Manufacturers and repairers of and dealers in dynamos, motors, armatures, magnetos, batteries, electrical plant and wireless and electrical components and accessories, etc. Directors: N. France, E. A. France and O. G. Batty. Regd. office: 155, New Road Side, Horsforth.

Magnus Electrical Trading Co., Ltd.—Registered 21st July. Capital £1,000. Wireless and electrical engineers and contractors, etc. Directors: R. A. Smith and H. Burton. Regd. office: 306, Hoe Street, Walthamstow, E.17.

S. Richards (Keighley), Ltd.—Registered 22nd July. Capital £2,000. Electrical engineers and general electrical installation contractors, etc. Directors: S. Richards and D. Richards. Regd. office: 7, Temple Street, Keighley.

Electropower Gears, Ltd.—Registered 25th July. Capital £2,000. General engineers, manufacturers of and agents for electric motors, gears and other electrical components, etc. Directors: L. P. Bevan and C. Bevan. Regd. office: Kingsbury Works, Kingsbury Road, N.W.9.

Bernard Woodmancy, Ltd.—Registered 25th July. Capital £7,000. To acquire the business of a radio and electrical engineer carried on by B. S. Woodmancy at 18, Market Place, 2 and 4, The Bridge, Frome, Somerset, as the Frome Auto Electric Service. Directors: B. S. Woodmancy and Mrs. Kathleen R. Woodmancy. Regd. office: 18, Market Place, Frome.

Morvis Electrical Co., Ltd.—Registered 25th July. Capital £1,000. General and mechanical engineers, electrical engineers and contractors, manufacturers of electrical apparatus, including wireless and television apparatus, etc. Subscribers: F. D. Jackson and H. J. Pinel. Solrs: J. S. L. Coxwell, 3-4, Clements Inn, W.C.2.

B.H.G. Television Sales and Service, Ltd.—Registered 25th July. Capital £8,000. To acquire the businesses of radio dealers and repairers carried on by (1) Wm. T. Beadle as Sales and Service at 70a, Streatham Hill, S.W., and (2) Albert E. Gillingham and Charles Hill as Streatham Radio at 23, Sternhold Avenue, S.W. Directors: Wm. T. Beadle, A. E. Gillingham, Wm. T. Beadle and C. Hill. Regd. office: 6a, Hervey Road, Camberwell, S.E.5.

Increases of Capital

Telephone Manufacturing Co., Ltd.—Increased by £500,000, in 5s ordinary shares beyond the registered capital of £500,000.

Barbados Electric Supply Corporation, Ltd.—Increased by £150,000, in £1 4½ per cent cumulative preference shares, beyond the registered capital of £200,000.

FINANCIAL SECTION
STOCKS and SHARES

BRITISH Government stocks, and the others which follow their fluctuations, continue to be an unusually active market considering the time of year. Stock Exchange men do not expect to be busy in the holiday season, but, at the present time, the turnover in the Consol market is on a large scale, and prices move erratically up and down according to who happen to be in the majority for the moment, the buyers or the sellers. At the beginning of this week the market enjoyed a sharp recovery, in which British Electricity and British Transport stocks participated. The effect of the improvement spread to other markets, and the ordinary shares of the best-class variety—the "blue chips" as they are popularly called—displayed a better tendency. Electrical equipment shares maintained their firmness reasonably well.

Week's Price Changes

Quotation of the shares ex dividend has left Mather & Platt at 48s 3d, Murex at 92s 6d and Falk, Stadelmann at 38s 3d, the reduction in the last named being 3s on the week. British Electric Traction at 1515 is 60 points down. Westinghouse Brake are dull at 62s 6d. Aberdare Cables lost 1s 9d, receding to 49s 6d. De La Rue at 26s 3d are 9d lower. On the other side of the sheet, Pye deferred at 27s have risen 9d, and Marconi Marine at 25s 9d are equally better. Modest gains made Enfield Cable 28s 3d, Johnson & Phillips 62s 6d, Thorn Electrical 16s 3d. Veritys rose a few pence to 2s 9d. The heavy group remains firm; Babcock & Wilcox at 56s 6d are again higher on the week.

Metal Industries

Metal Industries shares were amongst the very few in our price-lists to improve during July. They rose from 36s 3d to 41s 3d. The improvement seems to be fully justified by the report and accounts. The company announced last month a final dividend of 7 per cent less tax, making 10 per cent for the year to the end of March last, the net profits of the group being £118,000 up, as compared with the previous year. The profits work out to about 26 per cent on the ordinary capital, and at the current price, the yield is the fairly good return of £4 17s per cent. The company's undertakings are divided roughly into three groups, of which the electrical section comprises several which are well known in the trade. In 1947, the price touched 70s and the lowest over the last decade was 12s 6d in 1940, for which year the dividend was 5 per cent.

Globe Telegraph & Trust

The price of Globe Telegraph & Trust ordinary shares, after remaining steady at 40s for several weeks, has eased off to 37s 6d. At the meeting last week, the chairman remarked that he was unable to say what the future of this stock might be until a scheme of arrangement had been submitted to Cable & Wireless (Holding) stockholders. The Globe Telegraph investment in Cable & Wireless (Holding), he pointed out, is £3,252,668, which cost the Globe company rather over £2 million. The market value, six weeks ago, was over £5¾ million. The scheme from Cable & Wireless is expected about the middle of October.

Dubilier Condenser

Not normally a free market, the 1s shares of the Dubilier Condenser Co. have changed hands at around 2s 3d since the full accounts appeared at the end of last month. This price gives a yield of over 8¾ per cent on the 20 per cent dividend, which remains well covered despite the reduction in trading profits from £214,000 to £130,500 for the year ended in March. The dividend comes from earnings equal to 50 per cent (excluding a credit for tax over-provided) on the £77,000 ordinary capital. No additions are made this time to the general or dividend reserves, each of which received £20,000 a year ago, but these accounts stand at substantial figures and the carry-forward is raised this year by £30,000.

The Rise in Yields

The previous collapse in the prices of gilt-edged stocks naturally caused wide repercussions; amongst these, not the least have been the declines in the prices of ordinary shares in the industrial world. Electrical equipments have suffered with the rest, as our last week's prices showed clearly enough, and it is a matter of no great difficulty nowadays to obtain 4¼ to 4½ per cent on the money from such shares as Henley's, British Insulated Callender's, General Electric, English Electric and others of similar calibre. Returns of 4¾ per cent are available at to-day's prices from Johnson & Phillips, Lancashire Dynamo, J. Lucas, Siemens, Walsall Conduits, Allen West and others, while, for the more speculatively minded, 6 to 7 per cent can be obtained from ordinary shares in companies with good reputations, but whose shares can scarcely be reckoned in the front-rank of their groups.

Electricity Supply

Progress in Douglas : Connection Charges Questioned

AN increase in the sales of electricity from 24,211,484 kWh to 27,759,679 kWh is reported in the annual report of the Douglas, Isle of Man, electricity undertaking (electrical engineer and manager: Mr. C. Anderson). The average price obtained for all supplies rose from 1.722d to 1.737d. New consumers numbered 325, bringing the total to 7,418. The kWh sold per consumer (1,724) showed an increase of 173, kWh sold per head of population rising from 440 to 511. The maximum load was 9,198 kW (8,000 kW in 1947-48) and the load factor was 42.6 per cent (42.8 per cent). The bulk supply to the Isle of Man Electricity Board for distribution outside the Douglas Corporation's area of supply amounted to 14,691,253 kWh. The Board's maximum demand was 3,902 kW.

Work on the extension of Pulrose power station for the installation of a 5,000 kW turbo- generator and two 60,000 lb per hour boilers is proceeding. The piling for the building and plant is completed and the cooling tower and chimney are under construction. A considerable amount of reconstruction work has been carried out on the existing boiler plant by the power station staff with the result that a much higher degree of reliability has been attained. The total revenue amounted to £222,796 and the expenditure to £179,950, leaving a gross profit of £42,846. The balance on the net revenue account (£12,327) has been transferred to the reserve fund.

Water for Brighton "B" Station

The British Electricity Authority has applied to the Minister of Health for a licence to construct works and abstract underground water at the site of the Brighton "B" generating station, Southwick, to a maximum quantity of 240,000 gallons per day, and an estimated annual quantity of 20 million gallons. Any objections to the application must be submitted to the Secretary, Ministry of Health, Whitehall, London, S.W.1, within 28 days from the 12th August.

Connection Charges

The question of electricity connection charges was raised at a recent meeting of the Mold Urban District Council. In a letter from Connah's Quay U.D.C. it was stated that the Merseyside and North Wales Electricity Board was to impose a charge of £4 in the case of future housing schemes. Mold U.D.C. decided to reply that it agreed that no charge should be made and asked that the matter should be taken up with other local authorities with a view to representations being made to the Board.

Welsh Rural Supplies

Details of the South Wales Electricity Board's plans for extensions in the Crickhowell rural district were given by Mr. E. W. Jones, Eastern Sub-Area manager, at a meeting of the R.D.C. He said that Llanelly Hill and Clydach would probably have supplies within six or seven months, and the schemes for Llangynidr and extension of the Gilwern supply to Lower Common were well advanced.

Electrical Scheme Chosen

Following the submission of figures by both gas and electricity authorities, Stourport Urban District Council has approved a three-year plan for public lighting by electricity. The annual cost of gas lighting was given as £5,003 and of electric lighting £4,735. In the case of the former the purchase of equipment would have involved a capital expenditure of £25,000, while the electrical equipment would remain the property of the Midlands Electricity Board.

Sodium Lighting

It is planned to install sodium vapour lamps in Yorke Street and Sherwood Street, Woodhouse, Notts, at an estimated cost of £990.

Electricity Output

During the week ended 5th August, 620.6 million kWh was sent out for public supply from solid-fuel fired stations of the B.E.A. and North of Scotland Hydro-Electric Board. For the previous week the output was 611.9 million kWh and for the week ended 7th August last year 574.1 million kWh.

Portishead Development

If the British Electricity Authority erects the proposed new generating station at Portishead and builds 350 new houses for employees the urban district will undoubtedly be considerably developed. This

was pointed out to the Housing and Public Health Committee by the surveyor recently. He suggested meeting the County Council to prepare a plan for the urban and the surrounding area so that the development of local services could proceed.

Gas to Electricity

The Ministry of Transport has now given consent to the conversion of the gas lighting in Rochdale Road, Todmorden, to electric lighting. It is proposed to install 31 sodium lamps at an estimated cost of £2,000.

"Underground" Station Reconstruction

Preliminary work has begun on the reconstruction of Sloane Square station, which was practically destroyed by a bomb in 1940. The present works are limited to clearing the site of the original station and a new temporary entrance and ticket-hall have been opened in Holbein Place. The bombed station, which had been rebuilt only a few months before its destruction, incorporated escalators direct from the platforms to street level, an innovation so far as Underground stations were concerned. When the station is rebuilt the intention is to restore this facility.

Nottingham Lighting

The annual report of the Nottingham Lighting Committee states that about ten miles of electric lighting has been installed during the year and 628 lamps erected—a record number.

Estate Street Lamps

Blackpool Corporation is to provide street lighting on the first section of the Mereside housing estate (91 lamps) at an estimated cost of £2,700.

Large Belfast Surplus

Concessions to Power Users

A NET surplus on the year's working of £139,914 is recorded in the 1948-49 annual report of the city electrical engineer and general manager of Belfast (Mr. W. J. McC. Girvan). Revenue rose by £362,990 to £2,095,589, against which there was an increase in working expenses of £305,856 to £1,696,568, while capital charges and sundry expenditure were up by £23,533. With a balance of £14,742 from the previous year there was a total disposable sum of £154,649, of which £90,000 has been allocated to debt redemption and £26,353 to capital works.

In view of the heavy additional capital commitments and pending claims for pay increases it is not considered prudent to recommend a general reduction in charges which, apart from increases to cover the higher cost of coal (coal clauses apply to all tariffs), are at the pre-war level or lower. Concessions are, however, recommended to certain power users, and also consumers taking mainly off-peak lighting supplies. Examples are: power supplies on m.d. system, reduction of 0.0198d in net average price per kWh; shipyards, reduction of 0.02d; church, mission hall and school lighting, ½d per kWh reduction. There is to be a new tariff for industrial lighting and a revision of the tariffs for lighting supplies on the m.d. and load factor systems. Altogether the concessions amount to £19,305 a year. For convenience of accounting, rates of charge for special supplies are being increased to offset the raising of the basic coal clause price from 15s to 17s per ton. The report adds that it may be desirable to review these special rates later as it is questionable whether it is profitable to the undertaking to continue them.

During the year 285 million kWh was sold in the Corporation's supply area, an increase of 13 per cent over 1947-48. The main classes of consumption in million kWh with the previous year's figures in parentheses were: general power, 114.7 (97.8); domestic 78.6 (67.3); shipyards 41.0 (40.5); transport 36.4 (34.6); and lighting 14.2 (11.9). The number of consumers connected to the system during the year was 7,549.

Work proceeded on a scheme for the provision of additional 33 kV step-down substations, and preparatory work was carried out on plans for extensive reinforcement of the 33 kV system.

At the Harbour power station, which generated 290.8 million kWh, the installation of a 30,000 kW turbo-alternator and boiler plant ordered in 1946 was nearly completed, and orders have been placed for a further 30,000 kW set. Contracts have also been placed for dust extraction plant for four of the boilers at the station to reduce grit emission.

Since 1st January electricity generation in Northern Ireland has been co-ordinated under the Northern Ireland Joint Electricity Committee set up by the Electricity (Supply) Act, 1948.

Concerning Credit

Safeguards Against Bad Debts

By GORDON LOWE

ALL members of the electrical trades, whether manufacturers, wholesalers or retailers, are aware that conditions are less favourable than they were three years ago. From some aspects, the disappearance of the "sellers' market" is a good thing for industry as a whole, as it resuscitates the latent powers of competition and, to some degree, invention. Nevertheless, these gains must be offset by losses, and the principal of these are the general hardening of liquid positions, the extension of credit needs, and the recurrence of that most unwelcome part of the morning mail—an invitation to attend a meeting of creditors.

Credit, of course, is the essence of commercial trading, and originally implied little more than belief, confidence or trust, and it is only since the word became a commercial one that its application has been extended to cover amount and period of credit.

Widespread Falling-away

The general deterioration in creditworthiness is not confined to any one country or to any one trade or industry: it is a widespread, international falling away which is easily attributable to one or more of a variety of causes directly associated with the war. During those six years those engaged in the manufacture of equipment found themselves working twenty-four hours a day with machinery probably ill-suited to the actual output, and certainly incapable of standing up to the unfair wear and tear imposed upon it. As a consequence, from 1946 onwards the demand for replacement machinery was far in excess of supply, and only those organizations which had managed to hoard sufficient ready cash were able to re-equip. Those who required credit facilities for replacement machinery just joined a queue. But probably many of those who had the cash had deferred taxation liability and the laying out of funds in buying essential gear only involved shelving tax demands.

The circumstances mentioned applied mostly to businesses which existed before 1939, but, as soon as the war broke out, many people started up with little equipment and inadequate capital but with abnormal self-confidence. Backed with orders from Government Departments, they could hardly fail to go wrong. These mushroom firms could not have welcomed the end of the war, as it meant that to maintain any sort of balance they would have to enter into competition with pre-war businesses which, battered as they had been, did know a good deal of what competitive trading in a peaceful community really meant. Therefore, during 1946 and 1947 there was a gradual disappearance of these wartime "passengers." Some faded gracefully away, whilst others compounded with their creditors.

During a war period the credit capacity of the trading community is at its highest level. The total of individual failures in 1939 was slightly below 5,000, but, of course, this total has to be increased by the number of companies which wound up voluntarily or compulsorily. In 1945 this figure had fallen to 329, but ever since there has been a steady and rapid return to what may be regarded as "normal," and in 1949 it is not unusual to learn of what was believed to be a well-established and well-financed organization having to approach its creditors with an appeal for assistance and leniency.

Checking Credit Standing

With general trading conditions giving little indication of improvement, it is only fair to assume that there will be an increase in the number of businesses which present their creditors with the need to write off a bad debt. It is, therefore, well to consider what steps may best be taken to minimize the possible incidence. First, a careful, internal overhaul of the credit-granting system is

necessary. Is too great a reliance placed upon a past record of reasonably satisfactory payments? Is the credit policy overruled by the desire to maintain and increase turnover? A weeding-out process of those whose payment record indicates a tendency towards instability is the next step, but, of course, the total elimination of the small and relatively insignificant accounts will not achieve a very good purpose, as it may leave the supplier with too many eggs in one basket.

On the opening of a new and unknown account, no pains should be spared in probing carefully into creditworthiness. Whilst references will be taken up, it is always advisable to make independent investigations in trade circles, because few buyers offer referees who will not speak well of them. Counting house insistence on the acknowledgment of credit terms laid down in the contract of sale will make it clear to all debtors that the taking of an extra week or month is frowned on, and that they are expected to honour their engagements to the letter.

Insurance Possibilities

These and other niceties and refinements of commercial practice should go a long way towards tightening up credit systems, which, with time and the cash experience of the immediate post-war years, have, in many firms, tended to become rather loose. Capital tied up in book debts cannot be employed in the advancement of interests and insufficiency of liquid funds may deprive many an organization of the benefits of discounts.

But whatever precautions are taken bad debts are not entirely unavoidable. One method of safeguarding against the unexpected is the creation of a substantial bad debt reserve, a procedure which involves the setting aside of funds which could be better employed in productive competition. A more satisfactory, cheaper and more practical method is to take out an insurance policy which will relieve a creditor of the major portion of all bad debts which occur during any period of twelve months.

Credit insurance is a branch of the insurance industry whose value is less widely appreciated than, say, the fire and burglary sections. Both the Export Credits Guarantee Department of the Board of Trade and the private insurance market are giving excellent service to merchants and manufacturers who extend credit facilities to their customers in both export and domestic trade. Policies provide protection up to 90 per cent of all bad debt losses which, in point of fact, ensures that the capital involved in the passage of merchandise is ultimately recovered intact, and only the profit which would have accrued had the business gone through satisfactorily is lost.

Policies are designed to meet the particular demands of all trades and all branches of those trades, with the exception of the retail shop selling to the private customer. For such risk there is, as yet, no cover on offer, and arrangements by way of reserve must necessarily be made to allow for the possible loss on non-cash transactions.

The service of competent insurers includes the recommendation of suitable credit facilities and the confidential disclosure of payment records on the part of hundreds and thousands of credit buyers. A customer may pay one concern well, but it does not follow that other suppliers are getting equal treatment. This is normally known to the insurance market, whose information service is at the disposal of all policy holders.

Telecommunications Meetings

DELEGATES of the Government of the United States, led by Mr. Wayne Coy, chairman of the Federal Communications Commission, began a meeting in London last week with delegates of all the Governments of the British Commonwealth to discuss matters of mutual interest. The last similar meeting was in Bermuda in 1945, the outcome of which was the Bermuda agreement which, among other matters, established ceiling rates for wireless and cable communications between the countries of the Commonwealth and the United States. The present meeting, which is being held at the request of the Government of the United States, will review the Bermuda agreement, and more particularly the possible repercussions of decisions taken at the recent International Telegraph and Telephone Conference in Paris. The meeting was to be of a few days' duration only and later delegates will report to their Governments.

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—MELBOURNE.—24th August. State Electricity Commission of Victoria. 5-ton and 10-ton electrically operated cranes. (12th August.)

BRISBANE.—7th October. City Electricity Department. Twelve 33 kV oil circuit breakers. (C.R.E. (I.B.) 21545/49. Ten/555.)*

Bideford.—26th August. Town Council. Housing estate lighting.

17th September. General public lighting Particulars from the borough surveyor, Town Hall.

Birmingham.—12th September. Markets and Fairs Committee. Electrical installation at Smithfield Market. (12th August.)

29th September. Corporation Public Works Committee. Electrical installations, central heating, hot water supply and communal laundry installations in four blocks of flats. (See this issue.)

Clare.—2nd September. R.D.C. Complete internal wiring of sixteen Council houses at Stoke Road and Stradishall. Particulars from R. W. Bainton, clerk, 3, Wratting Road, Haverhill, Suffolk.

Cleethorpes. — Corporation. Transformers and/or switchgear for sewerage scheme. (12th August.)

Coventry.—5th September. Housing Committee. Electrical installations in 93 houses and 14 bungalows. (See this issue.)

Gloucester.—Education Committee. Electrical installation in new school. (See this issue.)

Hendon.—29th August. Corporation. Street lighting equipment. (12th August.)

Hitchin.—29th August. U.D.C. Electrical installations for fifty-six houses on Purwell Lane housing estate. (12th August.)

Lancashire.—County Council. Electrical installations in schools and supply of 37 refrigerators for day nurseries. (12th August.)

Hot-water and heating installation and electrical installation at Lytham St. Annes Technical School. Electrical installation at Prescot Maryville Road Junior School and for Winston Flixton Irlam Road Junior and Infants' School. (See this issue.)

Manchester.—Education Committee. Electrical installations at Heaton Park Temporary Primary School and at Charlestown Temporary Primary School. (See this issue.)

31st August. West Manchester Hospital Management Committee. Electric lamps for six months from 1st October next. (See this issue.)

Romford. — 1st September. Corporation. Electrical installations in 112 flats. (12th August.)

Roxburghshire.—29th August. County Council. Installation of electric lighting at the County Buildings, Jedburgh. Particulars from the county architect, County Offices, Newtown St. Boswells.

Sheffield.—30th September. Health Committee. Electric vehicle battery charging equipment. (See this issue.)

South Africa.—DURBAN.—14th October. City Electricity Department. Three 11 kV oil circuit-breakers. (C.R.E. (I.B.) 21048/49. Ten/543.)*

Uruguay. — MONTEVIDEO. — 5th September. Usinas Electricas y Telefonos del Estado. Telephone trunk cable and accessories (C.R.E. (I.B.) 21115/49. Ten/553.)*

* Specifications may be inspected at the Commercial Relations and Exports Department, Thames House North, Millbank, S.W.1.

Orders Placed

Durham.—County Council. Electrical installations at Cockton Hill County School (£1,385) and Stockton New Grammar School (£3,395).—R. Robson.

Electrical installations at Consett Grammar School (£1,825).—Steels Engineering Installations.

Electrical installation in huts in Church Street, Durham, for the Planning Department (£241).—A. Nesbitt, Durham.

Kidderminster.—Corporation. Electrical installation work in houses being erected by Wimpeys (£1,061).—Wilcox, Kidderminster.

Morley.—Corporation. Electrical installations in eighty houses in Garden House Lane and on the Albert Road extension (£2,304).—Hobson & Scott.

Newburn-on-Tyne.—U.D.C. Electric wiring of 12 houses at Throckley (£315) and 100 houses at Westerhope (£2,780).—W. C. Curry, Lemington.

Newcastle-on-Tyne.—City Council. Installation of a further 12 "Univector" heating units at the Byker transport depot (£251).—British Trane Co.

New Zealand.—Rythmatic ripple control; two injection equipments, 4,050 relays, for Taranga (£29,000).—Automatic Telephone & Electric Co., Ltd.

North Riding.—County Council. Electric light and power installation at police training establishment at Solberge Hall, Northallerton.—E. W. Garlick.

Sleaford.—Recommended. Rewiring 61 houses in Newfield Road, Sleaford (£855).—East Midlands Electricity Board.

South Shields.—Education Committee. Electrical installation at West Harton C. of E. School (£269).—A. J. Wares, Ltd., South Shields. Installation work at the Redwell Lane County Secondary School (£6,847).—Law & Burns.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Abergele.—Junior and infants' school, Sea Road; G. D. Wiles, county architect, Grove Park, Wrexham.

Blackpool.—Houses (138), Mereside estate; borough surveyor.

Factory, Clifton Road; Stuart Robinson & Co., Ltd., Norbreck Road.

Bolton.—Dwellings (113), on three sites; housing director, Town Hall.

Buxton.—Fire station and divisional headquarters, Compton Road area (£33,000); county architect, St. Mary's Gate, Derby.

Cardiff.—Dwellings (1,030), Thornhill Road, Llanishen; city surveyor.

Works, West Canal Wharf; Alfred Cook (Precision Engineers), Ltd., 2, Hampton Road.

Carlisle.—New block and 12 houses at Dovenby Hall Hospital for the Newcastle-on-Tyne Hospital Board, "Dunira", Osborne Road, Newcastle-on-Tyne; P. H. Knighton, planning architect.

Carmarthen.—Dwellings (68); L. Ovens, borough engineer, Municipal Buildings.

Chester.—Extensions to annexe, City Grammar School, Queen's Park; city surveyor, Municipal Offices.

Coventry.—Five-block shopping centre, new market, etc.; D. E. E. Gibson, city architect, 1a, Warwick Row.

Croydon.—Factory, stores and offices; Siggs & Chapman, Ltd., Tithe Barn Works, Purley Way.

Ealing.—Automatic sewage pumping station, Hanwell Works; C. W. Seddon, borough engineer, Town Hall, W.5.

Eston.—Fourteen houses for old people, Grangetown; U.D.C. surveyor, Council Offices, South Bank.

Falkirk.—Blocks of houses, Easter Carmuirs, Camelon (£80,000); burgh surveyor, Burgh Buildings, Newmarket Street.

Finchley.—Infants' and junior schools, Nether Street and Moss Hall Grove (£228,820); C. W. Radcliffe, clerk to Middlesex C.C., Guildhall Westminster, S.W.1.

Guildford.—Houses (563), Merrow area; borough surveyor.

Hawarden.—Pumping station, East Salthey Disposal Works site, and extensions to existing pumping station at Bretton; Elliot & Brown, engineers to R.D.C., Stanley House, Pelham Road, Nottingham.

Hemel Hempstead.—Three schools, South Hill and Adeyfield; county architect, County Hall, Hertford.

Hendon.—Flats (76), Edgworth Close, Malcolm Crescent and Talbot Crescent; Leonard Worden, town clerk, Town Hall, N.W.4.

Hucknall.—Junior school, High Leys (£100,000); county architect, Shire Hall, Nottingham.

Hull.—Factory, industrial site No. 9; Marsham Tyre Co., Ltd., 207, Oxford Street, W.1.

Ilford.—Shops and offices, 783/801, High Road; H. Machin, 174, Windermere Avenue, South Kenton.

Ilkeston.—Houses (336), Kirk Hallam estate; borough surveyor.

Irvine.—Houses (114), Bank Street and Quarry Road; Scottish Special Housing Association, Ltd., 15, Palmerston Place, Edinburgh.

Lichfield.—Houses (100), Wheel Lane estate; city surveyor.

London.—HACKNEY.—Dwellings (26), Holly Street; borough engineer.

LEWISHAM.—Extensions to Town Hall; J. Carr, borough engineer, Town Hall, Catford, S.E.6.

SOUTHWARK.—Shops and offices, Blackfriars Road and Union Street, for Associated Newspapers, Ltd.; Ellis, Clark and Gallanough, architects, 58, Grosvenor Street, W.1.

Nelson.—Infants' and nursery school, Marsden Park area; county architect, County Offices, Fishergate Hill, Preston.

Newcastle-on-Tyne.—Equipment of new workshops at Rutherford College (£18,500); G. Kenyon, architect, Education Committee Offices, Northumberland Road, Newcastle.

Newcastle-under-Lyme.—Houses (105) and maisonettes (32), Bradwell estate; architect, Bournville Estate Office, Birmingham.

Plymouth.—Houses (252), Whitleigh estate; city architect.

Portland.—Houses (78), Verne Common site, for U.D.C.; Crickmay & Son, architects, 23, St. Thomas Street, Weymouth.

Sheffield.—Engineering workshops, Gilpin Street; Quayle Bros., Ltd., 49a, Kilton Hill Road.

Stockport.—Junior and infants' school, Hempshaw Lane; Cruickshank & Seward, architects, 16, Princess Street, Manchester.

Stockton-on-Tees.—Factory for Rembrandt Dresses, Ltd.; C. Solomon, architect, 3, St. Mary's Place, Newcastle-on-Tyne.

Boys' dept., Oxbridge Lane School; borough architect, The Square.

Twenty houses for key workers; R.D.C. surveyor.

Stratford-on-Avon.—County infants' school (£440,000); county architect, Shire Hall, Warwick.

Sutton Coldfield.—Houses (38), Falcon Lodge estate; R. Walsh, town clerk, Council House.

Sturminster.—Houses (38), Shillingstone and Rixon, Sturminster Newton, for R.D.C.; J. S. Nevill, quantity surveyor, 24, West Street, Wimborne.

Tynemouth.—Potato crisp factory for Mrs. E. Olive; W. A. Cruickshanks, builder, 105, Closefield Grove, Whitley Bay.

West Bromwich.—Mineral water factory, Friar Park Road; Co-operative Wholesale Society, Ltd., 1, Balloon Street, Manchester.

Worthing.—Houses (60), fourth section of Maybridge estate; borough engineer.

Wyllie (Mon).—Pithead baths, canteen, medical centre, etc., for National Coal Board (Miners' Welfare Dept.) to cost £116,205; A. Roberts & Co., Ltd., builders, 79, Eccleston Square, S.W.1.

Yeovil.—Junior school, Rickleford, for Somerset E.C.; county architect, Park Street, Taunton.